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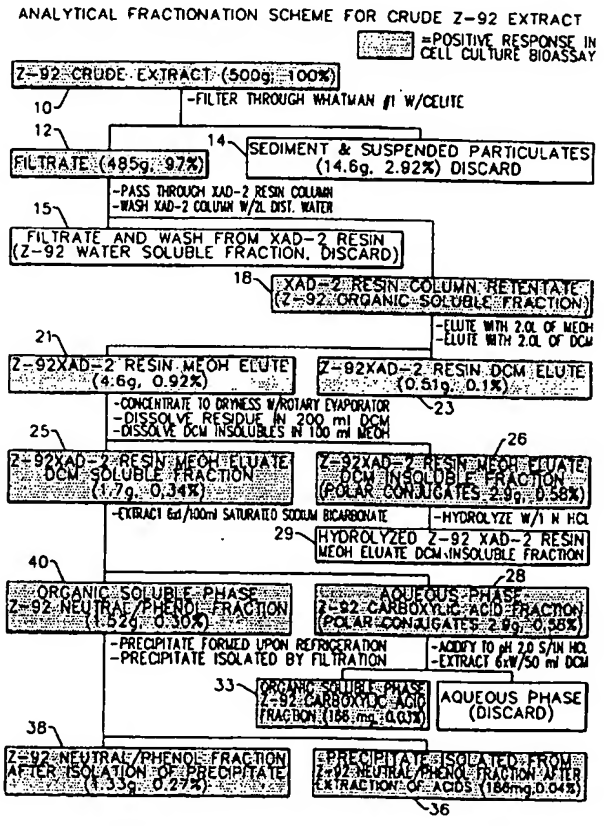
(57) Abstract

A psoriasis treatment composition derived from the plant *Asphodelus Microcarpus* includes 3-methylanthralin, chrysophanol, aloe-emodin, aloe-emodin monoacetate, and/or derivatives thereof. The composition is prepared by extracting a liquid from the *Asphodelus Microcarpus* root and mixing the liquid with acetic acid. A method of treatment includes applying the composition to an affected area of skin at a frequency sufficient to effect an alleviation of symptoms, typically once per day for 14-56 days.



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ANTIPSORIATIC COMPOSITIONS, METHOD OF MAKING, AND METHOD OF USING

BACKGROUND OF INVENTION

1. Field of the Invention

The present invention relates to skin treating compositions, to a method of making the compositions, and to a method of using the compositions in the treatment of skin. In another aspect, the present invention relates to antipsoriasis compositions, to a method of making the compositions, and to a method of using the compositions to treat psoriasis. In even another aspect, the present invention relates to botanical-derived skin treating compositions, to a method of making the compositions, and to a method of using the compositions to treat skin.

2. Description of the Related Art

Psoriasis is a chronic skin condition characterized by itchy, flaky skin. It is estimated that two percent of the United States population, more than four million people, will suffer from psoriasis during their lives. Psoriasis conditions can range from mild to severe.

In the United States, between about 150,000 and 250,000 new cases of psoriasis occur each year, with about 40,000 of these cases classified as severe. Sufferers of psoriasis must endure not only the irritating disease itself, but also the embarrassment of skin disfigurement.

The total annual cost for treating psoriasis on an outpatient basis is estimated at more than $1.5 billion. It is estimated that psoriasis sufferers are spending an average of $500 per year on psoriasis treatment to achieve only temporary relief. Severe cases that require hospitalization may require an expenditure of up to $10,000.

The compound 3-methylanthralin has long been utilized in the treatment of psoriasis, and is listed in the Merck Index as an antipsoriatic. Chrysarobin is a mixture of compounds

derived from Goa powder, and includes 3-methylanthralin. Goa powder itself is derived from the wood and bark of *Andria Araroba Aguiar (Fam. Leguminosae)*. Literature references describing the isolation of and structure of Chrysarobin date back to the early 1800s. A method of reducing Chrysarobin to obtain 3-methylanthralin was known as early as 1931.

Known psoriasis treatments include: antimetabolites such as methotrexate; corticosteroids such as triamcinolone creams or injection, clobeasol propinate cream, and hydrocortisone; keratolytic/destructive agents such as anthralin or salicylic acid; lubricants such as hydrogenated vegetable oils and white petroleum; oral retinoids such as etretinate or isotretinoin tablets; photochemotherapy such as methoxsalen or trioxsalen capsules, and coal tar; and topical cholecalciferol analogs such as calcipotriene ointment, a topical vitamin D3, known commercially as Dovonex ®, (Squib, Buffalo, NY).

Numerous botanical protocols for the treatment of psoriasis are known, including the use of extracts of various herbs, roots, seeds, flowers, berries, and twigs. See *Therapeutic Botanical Protocol for Psoriasis,* Protocol Journal of Botanical Medicines, August 1994, pp. 1-38.

However, the known psoriasis treatments suffer from one or more deficiencies, including potential toxic side effects and achieving only temporary relief. Thus there is a need for improved psoriasis treatment.

SUMMARY OF INVENTION

It is an object of the present invention to provide a composition and method of treating psoriasis.

It is another object of the present invention to provide a method for making 3-methylanthralin.

It is even another object of the present invention to provide a method of making chrysophanol.

It is still another object of the present invention to provide a method of making aloe-emodin.

It is a further object to provide a method of making aloe-emodin monoacetate.

It is an additional object to provide a composition extracted from a botanical specimen that has efficacy in treating psoriasis.

It is another object to provide such a composition having a plurality of polyphenols therein.

It is a further object to provide a method of treating psoriasis with such a composition.

It is yet another object to provide a method of extracting such a composition from the botanical specimen.

These and other objects of the present invention are achieved by the composition and methods of the present invention.

According to even still another embodiment of the present invention there is provided a method of making a product comprising at least one of 3-methylanthralin, chrysophanol, aloe-emodin, and aloe-emodin monoacetate comprising contacting root of the plant *Asphodelus Microcarpus* with acetic acid to form the product. A further embodiment of the method includes recovering 3-methylanthralin, chrysophanol, aloe-emodin, or aloe-emodin monoacetate from the product. Any of the products may be further derivatized.

According to yet even another embodiment of the present invention there is provided a method of obtaining either 3-methylanthralin, chrysophanol, or aloe-emodin by recovery of the desired compound from the root of the plant *Asphodelus Microcarpus*. The polyphenols may be further derivatized.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic representation of the analytical fractionation scheme utilized in Example 4.

FIG. 2 shown the peak assignments used to generate the data of Table 3 for the XAD-2 resin DCM eluate fraction 23.

FIGS. 3 and 4, show, respectively, the direct probe (DP) mass spectrometry data and liquid secondary ion mass

spectrometry (LSIMS) data pertaining to the XAD-2 resin DCM eluate fraction **23** of FIG. 1.

FIGS. 5, 6, and 7 show, respectively, a GC-MS chromatogram, DP data, and LSIMS data for the chemical composition of XAD-2 resin MeOH eluate DCM-insoluble fraction **26** of FIG. 1.

FIGS. 8, 9, and 10 show, respectively, a GC-MS chromatogram, DP data, and LSIMS data for the hydrolyzed XAD-2 resin MeOH eluate DCM-insoluble fraction **29** of FIG. 1.

FIGS. 11, 12, and 13 show, respectively, a GC-MS chromatogram, DP data, and LSIMS data for carboxylic acid fraction **28**.

FIG. 14 shows GC-MS chromatogram data from the methylated carboxylic acids of Example 5.

FIGS. 15, 16, and 17 show, respectively, a GC-MS chromatogram, DP data, and LSIMS data for the neutral/phenol fraction **36** of FIG. 1.

FIGS. 18-23 show, respectively, GC-MS chromatograms, DP data, and LSIMS data for the neutral/phenol fraction DCM silica gel eluate and the neutral/phenol fraction MeOH silica gel eluate.

FIG. 24 is a plot showing the effects of the treatment solution of Example 2 on HNF in fibroblasts.

DETAILED DESCRIPTION OF THE INVENTION

In the practice of the present invention, a composition is made from the plant *Asphodelus Microcarpus* that comprises compounds useful in the treatment of mammalian skin disorders, especially psoriasis. *Asphodelus Microcarpus* is a plant that is native to the Middle East; specifically, it can be easily found in the Northern regions of Israel, as well as in regions from the Canary Islands to Asia Minor.

In the practice of the present invention, the root of *Asphodelus Microcarpus* is utilized. In a specific embodiment of the present invention, the root or portions thereof may be

administered to treat mammalian skin disorders. Preferably, in such a treatment, the outer skin of the root is first removed, and then the inner portion of the root is applied to the afflicted skin region. Additionally, raw extract from the roots may also be applied to the afflicted skin region.

It is to be understood in the practice of the present invention that the roots of *Asphodelus Microcarpus* may be harvested at any time. However, it is preferred that the roots be harvested at a time when they are full of liquid which for *Asphodelus Microcarpus* growing in Israel is generally from February to May.

Preparation of the *Asphodelus Microcarpus* roots is generally as follows. Excess dirt and other foreign matter should be removed from the roots, generally by shaking and water washing. After dirt and other foreign matter have been removed from the root, the next step is to remove the outer layer of the root. This can be accomplished by using a scraper, knife, a peeler such as a potato peeler, or the like.

The next step is to extract liquid from the roots. Methods for obtaining liquid from a compressible liquid-containing solid are well known to those of skill in the art, and any such method may be utilized. Simple methods include mashing, squeezing, pulverizing, liquefying, or compressing the roots. Preferably, the roots are liquefied in a commercially available "juicer."

The liquid thus obtained is mixed with acetic acid. Generally for this step, the volume ratio of *Asphodelus Microcarpus* root juice to acetic acid is in the range of about 1:20 to about 20:1. Preferably, the volume ratio is in the range of about 1:10 to about 10:1, more preferably in the range of about 1:5 to about 5:1, even more preferably approximately 4:1.

The *Asphodelus Microcarpus* root liquid is next mixed with acetic acid at any temperature suitable for creating a mixture of 3-methylanthralin, chrysophanol, aloe-emodin, and aloe-emodin monoacetate. It is preferable that the mixing occur

with both the *Asphodelus Microcarpus* root liquid and acetic acid in the liquid state. Thus the contacting temperature is above the freezing point but below the boiling point for the mixture.

Optionally, in the practice of the present invention, brimstone may be mixed in with the *Asphodelus Microcarpus* root and acetic acid. The brimstone may be in any suitable form, but is preferably ground, and more preferably ground to a flour-like consistency.

The *Asphodelus Microcarpus* root/acetic acid mixture comprises 3-methylanthralin, chrysophanol, aloe-emodin, and aloe-emodin monoacetate and has been shown to be useful in the treatment of psoriasis. While this mixture is shown herein as being derivable from the *Asphodelus Microcarpus* root, it should be understood that the 3-methylanthralin, chrysophanol, and aloe-emodin can be obtained by the methods that are known in the art. Aloe-emodin monoacetate can be made by contacting aloe-emodin with acetic acid.

3-Methylanthralin, chrysophanol, aloe-emodin, and aloe-emodin monoacetate can be individually recovered from the mixture using separation techniques as are well known in the art.

The treatment composition of the present invention may include a wide range of the polyphenol components and/or their derivatives. In the method of the present invention for treating psoriasis, the composition may be administered to a mammalian organism by any route known in the art. Nonlimiting examples of suitable routes of administration include oral, parenteral, topical, and the like. Specific nonlimiting examples of carrying out such routes of administration include injection, IV administration, pills, tablets, capsules, liquids, gels, creams, soaps, shampoos, dermal patches, inhaled aerosols, sprays, suppositories, and the like. Topical administration is preferred for human psoriasis.

The frequency of administration varies with the strength of the composition, but an exemplary treatment schedule comprises a topical application once per day until symptoms are

eradicated. The course of treatment naturally is dependent upon the severity of the affliction, and may last from 14 days up to 56 days, although this is not intended as limiting.

The present invention is described as being suitable for the treatment of humans for psoriasis, which is to be understood to include, but not be limited to, exfoliative psoriatic dermatitis, pustular psoriasis, and guttatte variant psoriasis.

It is also believed that the compositions of the present invention are useful in the treatment of other skin disorders and conditions, including eczema.

In addition to being used in the treatment of skin disorders, the compositions of the present invention are also believed to be useful in the treatment of psoriatic arthritis.

EXAMPLES

The following examples are provided merely to illustrate the invention and are not intended to limit the scope of the invention in any manner.

Example 1 - Obtaining Raw Extract

Raw extract was obtained from the *Asphodelus Microcarpus* plant as follows. Approximately 1 lb of roots of the plant were obtained from a location in Israel. Dirt and other foreign matter was removed from the roots by shaking, and then by washing with water, after which the outer skin of the roots was removed. Liquid was extracted from the peeled roots utilizing a commercially available "juicer". The 1 lb of roots yielded approximately 300 cc of raw extract.

Example 2 - Preparation of Treatment Solution

Approximately 650 cc (although 400-800 cc are usable, depending upon the severity of the affliction) of the raw extract obtained by the method of Example 1, approximately 350 cc (although 200-600 cc are usable) of acetic acid, and

approximately 1 teaspoon of brimstone, ground to flour-like texture, were mixed together. This mixture does not require refrigeration, although the raw extract should be refrigerated until the acetic acid is introduced if kept in an unmixed state.

Example 3 - Analysis of the Treatment Solution

The treatment solution of Example 2 was subjected to various types of chemical and physical analysis, the results of which are presented in Tables 1 and 2.

Table 1

Proximate Analysis Data*

Physical description of sample	Dark brown liquid containing sediment and suspended particulate matter, acetic acid like odor
Ph (as received)	1.95
Acetic acid content (by titration)	5.05% w/w
Insoluble matter	2.14% w/w
Ash weight (mineral content)	0.746% w/w
Specific gravity (filtrate)	1.103 g/ml
Total dissolved solids (filtrate)	12.94% w/w
Chloroform extractables (filtrate) (organic soluble components)	0.84% w/w

*Analysis performed by Stillwell & Gladding Testing Laboratories, Inc., New York, N.Y.

Table 2

Elemental/Heavy Metal Composition*

Element	Conc. ppm	Element	Conc. ppm
Sulfur	4260	Bismuth	ND < 3 ppm
Potassium	1640	Lead	ND < 3 ppm
Calcium	1075	Antimony	ND < 3 ppm
Sodium	216	Boron	ND < 2 ppm
Phosphorous	142	Indium	ND < 2 ppm
Magnesium	100	Molybdenum	ND < 1 ppm
Silicon	7	Arsenic	ND < 1 ppm
Iron	7	Selenium	ND < 1 ppm
Aluminum	5	Tellurium	ND < 1 ppm
Zinc	2	Thallium	ND < 1 ppm
Tin	1	Lithium	ND < 1 ppm
Strontium	0.9	Cobalt	ND < 1 ppm
Copper	0.9	Niobium	ND < 1 ppm
Manganese	0.4	Gallium	ND < 1 ppm
Titanium	0.4	Germanium	ND < 1 ppm
Nickel	0.4	Silver	ND < 1 ppm
Chromium	0.2	Cadmium	ND < .5 ppm
Barium	0.1	Mercury	ND < .5 ppm
Vanadium	0.06	Beryllium	ND < .1 ppm

* Elemental/heavy metal analysis was conducted by Umpire and Control Services, Inc., West Babylon, N.Y.

Example 4 - Fractionation of Treatment Solution

The solution of Example 2 was also subjected to analysis. As the solution of Example 2 is too complex for direct analysis, it was fractionated according to the scheme in FIG. 1 using a combination of wet analytical chemistry, column chromatography and solvent extraction procedures. Throughout the analytical fractionation, isolates were subjected to cell culture bioassay, as described in Example 6. Fractions testing positive in the cell culture bioassay were then directed to additional separation and/or chemical characterization until nearly pure isolates were obtained.

A 500 g sample **10** of the treatment solution of Example 2 was filtered through a Buchner funnel containing Whatman #1 filter paper and a 1 cm bed volume of Celite® analytical filtering aid. The filtrate **12** (485 g, 97% of original sample) tested positive in the cell culture bioassay and was equivalent in potency to the unfiltered treatment solution of Example 2. The filter retentate **14** (14.6 g, 2.92%) was a dark reddish brown colored material with a clay-like consistency. This substance tested negative in the cell culture bioassay. Analysis of this sediment indicates it to be largely composed of sucrose, complex carbohydrates, cellulosic debris, lignins, inorganic minerals, and clay.

The filtrate was then passed through a preconditioned chromatographic column packed with a 20 x 350 mm bed volume of XAD-2 resin. (Supelcopak-2® absorbent) at a flow rate of 5 ml/minute. XAD-2 resin is a hydrophobic porous polymer absorbent based on styrene-divinylbenzene copolymer. This resin has a high affinity for absorbing nonpolar, organic-soluble components from aqueous solutions. The column was preconditioned by washing it with 1.0 L of dichloromethane (DCM), followed by 1.0 L of methanol (MeOH) and finally 1.0 L of distilled/deionized water. All solvents were ultra-high-purity "capillary-analyzed" grade suitable for trace-level chemical analysis procedures. The distilled water used throughout the analysis was obtained from

a Milli-Q® purification system. It was double distilled in glass and then further purified by passing it through ion-exchange and activated carbon filters. After the filtrate was passed through the XAD-2 resin, the column was washed with 2 L of distilled water. The filtrate and wash **15** from the XAD-2 resin column tested negative in the call culture bioassay and were discarded. This dark brown colored fraction contains the water-soluble compounds of the treatment solution, such as acetic acid, sugars, low-molecular-weight polar organic acids, tannins, and other biologically inert components.

The XAD-2 resin column containing the treatment solution retentate **18** was blown dry to remove as much of the residual wash water as possible. The treatment solution organic-soluble components were then eluted from the column with 2.0 L of MeOH followed by 2.0 L of DCM. The MeOH and DCM XAD-2 resin eluates were collected separately. The treatment solution XAD-2 resin MeOH eluate **21** yielded 4.6 g, which corresponds to 0.92% of the original treatment solution on a weight basis. The eluate was amber colored. The treatment solution XAD-2 resin DCM eluate **23** contained 0.51 g or 0.1% of the original sample. This eluate was bright yellow colored. Both of these fractions tested positive in the cell culture bioassay. However, higher activity was observed in the treatment solution XAD-2 resin MeOH eluate. Therefore, this isolate was subjected to additional fractionation.

The treatment solution XAD-2 resin MeOH eluate **21** was concentrated to dryness in a round bottom flask using a rotary evaporator at reduced temperature and pressure. The residue was a dark red crystalline substance. The residue was dissolved in 200 ml of DCM, producing an amber-colored solution. However, not all the residue was soluble in DCM. The DCM-insoluble materials were then dissolved in 100 ml of MEOH. The methanol-soluble components had a dark red color. Thus two additional fractions were prepared. The treatment solution XAD-2 resin MEOH eluate DCM-soluble fraction **25** contained 1.7 g (0.34%), and the

treatment solution XAD-2 resin MeOH eluate DCM-insoluble fraction **26** yielded 2.9 g (0.58%). Both of these fractions tested positive in the cell culture bioassay.

The treatment solution XAD-2 resin MEOH eluate DCM-soluble fraction **40** contains organic-soluble neutral, phenolic, and acidic components. It was extracted 6 times with 100 ml portions of saturated sodium bicarbonate solution to remove the carboxylic acid fraction. The saturated sodium bicarbonate extract **28** was acidified to Ph 2.0 using 1 N HCL and then back-extracted 6 times with 50 ml portions of DCM to partition the carboxylic acids into the organic phase. The treatment solution carboxylic acid fraction **33** contained 166 mg (0.03%) and was weakly positive in the cell culture bioassay. The fraction had an amber-colored appearance.

The treatment solution XAD-2 resin MeOH eluate DCM-soluble fraction, after extraction of the carboxylic acids, contained 1.52 g or 0.30% of the original sample. This isolate **31** was named the treatment solution "neutral/phenol fraction" based on its chemical composition. It yielded a strong positive response in the cell culture bioassay. Upon refrigeration this fraction was observed to form a yellow-orange-colored crystalline precipitate. The precipitate was isolated by filtration through a sintered glass type Gooch crucible. The precipitate **36** isolated from the neutral/phenol fraction after extraction of acids yielded 186 mg (0.04%) of bright yellow-orange crystals. This isolate was found to be the most highly active fraction in the cell culture bioassay. The neutral/phenol fraction **38** after harvesting of the crystalline precipitate was found to contain 1.33 g (0.27%). This sample also tested strongly positive in the cell culture bioassay.

Some additional subfractions were prepared from the isolates described above. A portion of the treatment solution carboxylic acid fraction was methylated with diazomethane reagent to produce the corresponding methyl esters of the sample. This was done to enhance the volatility of the acids to improve the

gas chromatographic separation. The treatment solution XAD-2 resin MeOH eluate DCM-insoluble fraction was hydrolyzed with 1 N Hcl for 4 hours at 100°C to break down glycosidically conjugated species. The treatment solution neutral/phenol fraction 29 after harvesting of precipitate was subjected to additional minicolumn fractionation using a silica gel solid-phase extraction column. These procedures are described in more detail Example 5.

Example 5 - Chemical Characterization of the Fractions of Example 4

The nonvolatile components of the fractions were analyzed by a combination of electron ionization direct probe mass spectrometry (DP data) and by a high-mass technique, liquid secondary ion mass spectrometry (LSIMS data).

The chemical composition of the XAD-2 resin DCM eluate fraction 23 is shown in Table 3, with peak assignments corresponding to the GC-MS chromatogram shown in FIG. 2. The DP and LSIMS spectra pertaining to the XAD-2 resin DCM eluate fraction 23 are shown in FIGS. 3 and 4, respectively. A homologous series of nonvolatile compounds with molecular weights 474, 490, 506, and 508 were detected in the DP data. Accurate mass measurements were performed on these peaks using high-resolution (R = 10,000) mass spectrometry in order to determine their elemental formulas. The empirical formulas for these compounds were found to be $C_{23}H_{22}O_{11}$ (474 MW), $C_{23}H_{22}O_{12}$ (490 MW), $C_{13}H_{22}O_{13}$ (506 MW), and $C_{23}H_{24}O_{13}$ (508 MW). In other fractions related homologues with molecular weights 478 and 492 were also observed. Exact chemical structures for these compounds are unknown. However, their elemental formulas and mass spectral fragmentation patterns indicate that they are a class of polyphenolic chemical compounds called bisflavanoids.

The chemical composition of XAD-2 resin MeOH eluate DCM-insoluble fraction 26 is summarized in Table 4. The GC-MS chromatogram, DP data, and LSIMS data pertaining to this fraction are presented in FIGS. 5, 6 and 7. Most of this fraction was

nonvolatile, and so the GC-MS peaks described make up only a small portion of this sample. The majority of the mass in this fraction consists of high-molecular-weight nonvolatile compounds. The DP data show relatively trace levels of several bisflavanoids. The LSIMS data show a complex mixture of high-mass compounds in the range 300-1000 to be present in this fraction. This fraction largely consists of "bound" compounds such as glycosides (phenolic compounds bound to sugar molecules) and other polar high-molecular-weight conjugates. This fraction was digested with HCl and heat in order to hydrolyze the conjugates down to small molecules, which could then be identified.

The data on the hydrolyzed XAD-2 resin MeOH eluate DCM-insoluble fraction 29 are summarized in Table 5. The GC-MS chromatogram, DP data, and LSIMS data for this fraction are shown in FIGS. 8, 9, and 10, respectively. Please note that the compounds in Table 3 that appear following hydrolysis are all present as bound components in the original fraction.

Table 3

Chemical Composition XAD-2 Resin DCM Eluate
Fraction 23 of FIG. 1

MS Spec #	Compound (Synonyms, Common Names, Comments, Etc.)	CAS #	Peak Area %
66	phenol	108-95-2	1.43
282	sulfur (elemental sulfur six membered ring)	NA	0.90
372	dibutylphthalate (plasticizer)	84-74-2	0.29
441	hexadecanoic acid (palmitic acid)	57-10-3	0.11
445	sulfur (S-8, cyclic sulfur, orthothrombic sulfur, molecular sulfur)	10544-50-0	9.02
452	1-hexadecanol (hexadecyl alcohol)	36653-82-4	0.81
485	linoleic acid	60-33-3	0.91
519	3-methyl-1,8,9-anthracenetriol (3-methylanthralin, Chrysarobin)	491-59-8	5.86
527	1,8-dihydroxy-3-methyl-9,10-anthracenedione (Chrysophanol, Chrysophanic acid, 1,8-dihydroxy-3-methyl-1,8-anthraquinone)	481-74-3	11.76
549	1,8-dihydroxy-3-(hydroxymethyl)-9,10-anthracenedione (Aloe-Emodin)	NA	0.14
574	2,4-bis(dimethylbenzyl)-6-t-butylphenol	NA	0.27
583	di-2-ethylhexylphthalate (plasticizer)	117-81-7	65.44
619-622	monoacetate derivative of 1,8-dihydroxy-3-(hydroxymethyl)-9,10-anthracenedione (Aloe-Emodin monoacetate)	NA	2.23
DP Data	bis-flavanoids with m.w.'s 474 ($C_{23}H_{22}O_{11}$), 490 ($C_{23}H_{22}O_{12}$), 506 ($C_{23}H_{22}O_{13}$) and 508 ($C_{23}H_{24}O_{13}$) exact chemicals structures unknown	NA	1.73 (est. total for DP & LSIMS)
LSIMS Data	unknown high mass compounds m.w. 608 & 696	NA	1.73 (est. total for DP & LSIMS data

DP = Data is from Electron Ionization Direct Insertion Probe
LSIMS = Liquid Secondary Ion Mass Spectrometry

Table 4

Chemical Composition XAD-2 Resin MeOH Eluate
DCM-Insoluble Fraction (Fraction 26 of FIG. 1)

MS Spec #	Compound (Synonyms, Common Names, Comments, Etc.)	CAS #	Peak Area %
423	palmitic acid	57-10-3	17.05
447	unk. 216 m.w. aromatic	NA	2.41
468	linoleic acid	60-33-3	28.08
519	3-methyl-1,8,9-anthracenetriol (3-methylanthralin, Chrysarobin)	491-59-8	27.82
527	1,8-dihydroxy-3-methyl-9,10-anthracenedione (Chrysophanol, Chrysophanic acid, 1,8-dihydroxy-3-methyl-1,8-anthraquinone)	481-74-3	12.78
583	di-2-ethylhexylphthalate (plasticizer)	117-81-7	11.87
DP Data	bis-flavanoids with m.w.'s 492 ($C_{23}H_{24}O_{12}$) and 506 ($C_{23}H_{22}O_{13}$) exact chemicals structures unknown	NA	trace
LSIMS Data	complex mixture of unknown compounds m.w. range 300-1000 (bound components, glycosides, high m.w. polar conjugates etc.)	NA	major

DP = Data is from Electron Ionization Direct Insertion Probe raw data file FM10647
LSIMS = Liquid Secondary Ion Mass Spectrometry Data file VG2268

Table 5

Chemical Composition of Hydrolyzed XAD-2 Resin MeOH Eluate DCM-Insoluble (Fraction 29 of FIG. 1)

MS Spec #	Compound (Synonyms, Common Names, Comments, Etc.)	CAS #	Peak Area %
57	fumaric acid	110-17-8	4.14
97	2-ethyl-1-hexanol (plasticizer degradate)	104-76-7	1.8
123	2-furancarboxylic acid	88-14-2	2.64
151	4-oxo-pentanoic acid (levulinic acid)	123-76-2	5.38
183	α-hydroxyhexanoic acid	NA	0.62
271	branched dodecanol isomer	NA	1.56
278	1-chlorododecane (probably a hydrolysis artifact)	112-52-7	0.91
282	1-dodecanol (lauryl alcohol)	112-53-8	15.7
318	dodecanoic acid (lauric acid)	143-07-7	2.54
345	tributylphosphate (plasticizer)	126-73-8	1.29
348	1-tetradecanol (myristyl alcohol)	112-72-1	5.89
361	2-ethoxy-1-dodecanol	29718-44-3	7.09
365	2,8-dihydroxy-3-methyl-1,4-napthoquinone (Droserone)	NA	3.29
378	tetradecanoic acid (myristic acid)	544-63-8	2.31
420	2-ethoxy-1-tetradecanol	NA	3.01
422	methyl palmitate	112-39-0	0.46
428	7-hydroxy-5-methoxy-2-methyl-4-oxo-4H-1-benzopyran-6-carboxaldehyde	7338-51-4	1.15
441	hexadecanoic acid (palmitic acid)	57-10-3	7.54
440	α-hydroxylauric acid	NA	3.4
461	heptadecanoic acid (margaric acid)	506-12-7	0.32
449	oleic acid	112-80-1	0.69
480	linoleic acid	60-33-3	4.93
511	α-hydroxymyristic acid	2507-55-3	0.42
488	octadecanoic acid (stearic acid)	57-11-4	1.35
516	3-methyl-1,8,9-anthracenetriol (3-methylanthralin, Chrysarobin)	491-59-8	0.42
520	1,8-dihydroxy-3-methyl-9,10-anthracenedione (Chrysophanol, Chrysophanic acid, 1,8-dihydroxy-3-methyl-1,8-anthraquinone)	481-74-3	4.71
574	di-2-ethylhexylphthalate (plasticizer)	117-81-7	4.48
DP Data	bis-flavanoids with m.w.'s 478 ($C_{22}H_{22}O_{12}$), 492 ($C_{23}H_{24}O_{12}$) and 506 ($C_{23}H_{22}O_{13}$) exact chemicals structures unknown	NA	11.98

DP = Data is from Electron Ionization Direct Insertion Probe raw data file FM10827

The carboxylic acid fraction **28** data are summarized in Table 6. The GC-MS chromatogram, DP data, and LSIMS data pertaining to this fraction **28** are presented in FIGS. 11, 12, and 13. Carboxylic acid fractions often contain nonvolatile species that do not readily pass through gas chromatography. These compounds can be chemically derivatized into more volatile forms using methylation or silylation reagents. Therefore, the carboxylic acid fraction **28** was methylated using freshly prepared diazomethane reagent. This procedure converts the carboxylic acids into their corresponding methyl esters. Phenols are converted into methyl ethers. The methyl esters and methyl ethers are more volatile and chromatograph better than the free acids.

The GC-MS chromatogram from the methylated carboxylic acids is shown in FIG. 14. No additional compounds were detected in the methylated sample. All the same compounds observed in the underivatized carboxylic acid fraction were found as their methylated counterparts.

Table 7 summarizes the chemical composition of the yellow precipitate which was isolated from the neutral/phenol fraction **36** after extraction of the carboxylic acids. This fraction, which contains relatively few components, possesses the highest degree of activity in the cell culture bioassay. The GC-MS chromatogram, DP data, and LSIMS data pertaining to this fraction are shown in FIGS. 15-17.

Table 6

Chemical Composition of Carboxylic Fraction
(Fraction 28 FIG. 1)

MS Spec #	Compound (Synonyms, Common Names, Comments, Etc.)	CAS #	Peak Area %
37-40	2-methylacrylic acid	79-41-4	14.4
49	2-methylbutyric acid	116-53-0	2.04
57	pentanoic acid	109-52-4	2.2
118	hexanoic acid	142-62-1	3.52
120	2-furancarboxylic acid	88-14-2	9.18
153	unknown 138 m.w. sulfur containing compound	NA	2.7
167	2-ethylhexanoic acid	149-57-5	1
181	benzoic acid	65-85-0	2.91
197	octanoic acid	124-07-2	6.29
217	benzeneacetic acid	103-82-2	1.2
227	nonanoic acid	112-05-0	4.74
242	decanoic acid	334-48-5	5.2
273	2-hydroxy-3-methylbenzoic acid (creosotic acid, homosalicylic acid)	83-40-9	0.77
277	phenylpropenoic acid (cinnamic acid)	621-82-9	0.69
305	3,4-dichlorobenzoic acid	51-44-5	0.88
318	dodecanoic acid (lauric acid)	143-07-7	0.62
323	10-undecenoic acid	112-38-9	0.72
328	nonanedioic acid	123-38-9	0.54
329	pentachlorophenol (wood preservative)	87-86-5	0.11
342	3-methoxy-4-hydroxybenzaldehyde (vanillin)	121-33-5	0.75
372	p-coumaric acid, methyl ester	3943-97-3	1.23
378	tetradecanoic acid (myristic acid)	544-63-8	0.72
395	methyl ferulate	2309-07-1	0.72
408	methyl ester of 3,4-dimethoxycinnamic acid	5396-64-5	0.71
414	1,4-benzene dicarboxylic acid (terephthalic acid)	100-21-0	0.67
423	3,4-dihydro-4,8-dihydroxy-3-methyl-isocoumarin (6-hydroxymellein)	309-51-112	0.42
427	9-hexadecenoic acid (palmitoleic acid)	2091-29-4	0.55
434	hexadecanoic acid (palmitic acid)	57-10-3	1.9
438	9-octadecenoic acid (oleic acid)	112-80-1	0.49
478	9,12-octadecadienoic acid (linoleic acid)	60-33-3	1.03
484	octadecanoic acid (stearic acid)	57-11-4	0.69
491	3-methyl-1,8,9-anthracenetriol (3-methylanthralin, Chrysarobin)	491-59-8	0.55
516	1,8-dihydroxy-3-methyl-9,10-anthracenedione (Chrysophanol, Chrysophanic acid, 1,8-dihydroxy-3-methyl-1,8-anthraquinone)	481-74-3	1.3
572	di-2-ethylhexylphthalate (plasticizer)	117-81-7	0.6
633	squalene	7683-64-9	0.74
DP Data	bis-flavanoids with m.w.'s 492 ($C_{17}H_{16}O_{11}$) and 506 ($C_{28}H_{22}O_{11}$) exact chemicals structures unknown	NA	27.22 est. total for DP & LSIMS
LSIMS Data	unknown high mass compounds m.w. 530, 654 and 740	NA	27.22 est. total for DP & LSIMS

DP = Data is from Electron Ionization Direct Insertion Probe raw data file FM10648
LSIMS = Liquid Secondary Ion Mass Spectrometry Data file VG2267

Table 7

Chemical Composition Precipitate Neutral/Phenol Fraction after Extraction of Acids (Fraction 36 of FIG. 1)

MS Spec #	Compound (Synonyms, Common Names, Comments, Etc.)	CAS #	Peak Area %
419	methyl palmitate	112-39-0	0.53
464	methyl linoleate	112-63-0	1.09
510	3-methyl-1,8,9-anthracenetriol (3-methylanthralin, Chrysarobin)	491-59-8	19.69
517	1,8-dihydroxy-3-methyl-9,10-anthracenedione (Chrysophanol, Chrysophanic acid, 1,8-dihydroxy-3-methyl-1,8-anthraquinone)	481-74-3	57.41
583	di-2-ethylhexylphthalate (plasticizer)	117-81-7	18.35
DP Data	bis-flavanoids with m.w.'s 474 ($C_{23}H_{22}O_{11}$), 492 ($C_{23}H_{24}O_{12}$), 506 ($C_{23}H_{22}O_{13}$) and 508 ($C_{23}H_{24}O_{13}$) exact chemicals structures unknown	NA	2.93 (est. total for DP & LSIMS)
LSIMS Data	unknown high mass compounds m.w. 618, 662, 696, 718, 736 and 758	NA	2.93 (est. total for DP & LSIMS data

DP = Data is from Electron Ionization Direct Insertion Probe raw data file FM10645
LSIMS = Liquid Secondary Ion Mass Spectrometry Data file VG2270

The neutral/phenol fraction following extraction of carboxylic acids and harvesting of the yellow precipitate was still too complex for direct analysis. Therefore, it was subjected to additional fractionation using a silica gel solid

phase extraction minicolumn procedure. The fraction was passed through the silica gel column and was washed with DCM. A second more polar fraction was then eluted from the column using methanol. Out of the original 1.32 g of neutral/phenol fraction were recovered 0.73 g (0.15% of original crude extract) in the DCM eluate and 0.59 g (0.12%) in the MeOH eluate. Therefore, the neutral/phenol fraction following extraction of carboxylic acids and harvesting of yellow precipitate was split into two additional subfractions for analysis. These were named the neutral/phenol fraction DCM silica gel eluate and the neutral/phenol fraction MEOH silica gel eluate. The chemical compositions of these two fractions are summarized in Tables 8 and 9. The GC-MS chromatograms, DP data, and LSIMS data pertaining to these two fractions are shown in FIGS. 17 through 22.

Table 8

Chemical Composition Neutral/Phenol Fraction
Silica Gel MEOH Eluate

MS Spec #	Compound (Synonyms, Common Names, Comments, Etc.)	CAS #	Peak Area %
134	3,5,5-trimethyl-2-cyclohexene-1-one (isophorone)	78-59-1	0.83
205-225	5-hydroxymethylfurfuryl acetate (HMF acetate)	10551-58-3	6.24
231	glycerylmonoacetate	26446-35-5	1.03
244	glyceryldiacetate	25395-31-7	0.6
248	glyceryltriacetate (triacetin)	102-76-1	1
254	decanoic acid	334-48-5	0.18
295	1,4-butanediol diacetate	628-67-1	0.57
311	unknown aromatic acetate	NA	0.53
319	unknown aromatic acetate	NA	0.65
326	dodecanoic acid (lauric acid)	143-07-7	2.11
334	1,4-benzenediol monoacetate (hydroquinone monoacetate)	NA	2.03
353	unknown aromatic acetate	NA	0.29
359	unknown aromatic acetate	NA	0.13
372	myristic acid	544-63-8	2.66
399	unknown aromatic acetate	NA	0.5
405	pentadecanoic acid	1002-84-2	1.6
421	1,4-benzenedicarboxylic acid (terephthalic acid)	100-21-0	0.58
428	hexadecanoic acid (palmitic acid)	57-10-3	11.58
456	heptadecanoic acid	506-12-7	1.67
474	linoleic acid	60-33-3	2.88
500	octadecanoic acid (stearic acid)	57-11-4	39.02
520	3-methyl-1,8,9-anthracenetriol (3-methylanthralin, Chrysarobin)	491-59-8	2.57
529	1,8-dihydroxy-3-methyl-9,10-anthracenedione (Chrysophanol, Chrysophanic acid, 1,8-dihydroxy-3-methyl-1,8-anthraquinone)	481-74-3	5.7
539-575	mixture of long chain aliphatic acetates	NA	4
583	di-2-ethythexylphthalate (plasticizer)	117-81-7	0.55
616	1,8-dihydroxy-3-(hydroxymethyl)-9,10-anthracenedione (Aloe-Emodin)	NA	3.82
622	monoacetate derivative of 1,8-dihydroxy-3-(hydroxymethyl)-9,10-anthracenedione (Aloe-Emodin monoacetate)	NA	1.34
636	unknown 378 m.w. aromatic acetate	NA	0.77
644	squalene	7683-64-9	0.27
DP Data	bis-flavanoids with m.w.'s 474 ($C_{27}H_{22}O_{11}$), 478 ($C_{26}H_{22}O_{12}$), 490 ($C_{27}H_{22}O_{12}$), 492 ($C_{26}H_{24}O_{12}$), 506 ($C_{27}H_{26}O_{12}$) and 508 ($C_{26}H_{28}O_{12}$) exact chemicals structures unknown	NA	4.3 (est. total for DP & LSIMS)
LSIMS Data	unknown high mass compounds m.w. 608, 680 and 698	NA	4.3 (est. total for DP & LSIMS data

DP = Data is from Electron Ionization Direct Insertion Probe raw data file FM10650
LSIMS = Liquid Secondary Ion Mass Spectrometry Data file VG2265

Table 9

Chemical Composition Neutral/Phenol Fraction Silica Gel DCM Eluate

MS Spec #	Compound (Synonyms, Common Names, Comments, Etc.)	CAS #	Peak Area %
283	unknown 154 m.w. compound	NA	0.29
288	2,3-dihydro-2,5-dimethyl-4H-1-benzopyran-4-one	69687-87-2	0.88
278	S-6 hexasulfide (six membered ring structure)	NA	1.35
283	2,6-di-t-butyl-p-hydroxyanisole (antioxidant)	NA	2.12
295	butylated hydroxy toluene (BHT, antioxidant)	128-37-0	3.65
301	methyl laurate	111-82-0	1.47
323	diethylphthalate (plasticizer)	84-66-2	1.06
329	dodecyl acetate	112-66-3	1.82
358	unknown benzoate	NA	0.65
365	methyl tridecanoate	1731-88-0	1.35
369	α-hexylcinnamic aldehyde	101-86-0	0.65
373	benzyl benzoate	120-51-4	0.71
386	methylpentadecanoate	7132-64-1	0.82
390	tetradecyl acetate	638-59-5	0.59
404	benzyl salicylate	118-58-1	1.35
417	acetylferulic acid	2596-47-6	2.12
425	methyl palmitate	112-39-0	4.53
433	dibutylphthalate	84-74-2	2.00
441	sulfur (S-8, cyclic sulfur, orthothrombic sulfur, molecular sulfur)	10544-50-0	3.59
447	hexadecyl acetate	629-70-9	1.88
451	methyl heptadecanoate	1731-92-6	0.94
471	methyl linoleate	112-63-0	15.82
478	methyl stearate	112-61-8	0.76
515	3-methyl-1,8,9-anthracenetriol (3-methylanthralin, Chrysarobin)	491-59-8	5.08
519-533	1,8-dihydroxy-3-methyl-9,10-anthracenedione (Chrysophanol, Chrysophanic acid, 1,8-dihydroxy-3-methyl-1,8-anthraquinone)	481-74-3	15.00
543	di-2-ethylhexylphthalate (plasticizer)	117-81-7	12.53
617	monoacetate derivative of 1,8-dihydroxy-3-(hydroxymethyl)-9,10-anthracenedione (Aloe-Emodin monoacetate)	NA	6.24
639	methyl farnesate	10485-70-8	1.06
DP Data	bis-flavanoids with m.w.'s 474 ($C_{27}H_{22}O_{11}$), 490 ($C_{27}H_{22}O_{12}$), 492 ($C_{27}H_{24}O_{12}$), 506 ($C_{27}H_{22}O_{13}$) and 508 ($C_{27}H_{24}O_{13}$) exact chemicals structures unknown, also unknown peaks at m.w. 570 and 602	NA	9.71 (est. total for DP & LSIMS)
LSIMS Data	unknown high mass compounds m.w. 540, 616, 646 and 662	NA	9.71 (est. total for DP & LSIMS data

DP = Data is from Electron Ionization Direct Insertion Probe raw data file FM10649
LSIMS = Liquid Secondary Ion Mass Spectrometry Data file VG2255

The data obtained from all of the fractions of Example 4 were pooled together and normalized to produce a comprehensive summary. These data are summarized in Tables 10A-F, which describe the chemical composition of the organic soluble fraction, which constitutes approximately 1% of the treatment solution on a w/w basis but contains 100% of the biological activity. The compounds in this table are grouped together by chemical class. It should be noted that the quantitative date (% w/w) provided in this and the other tables are not exact but rather are semiquantitative. The data were derived from a combination of GC area % integrations and from gravimetric determinations made throughout the fractionation. Highly accurate quantitation data would only be possible if analytical reference standards were available for all compounds detected so that detector response factors could be determined and the data adjusted.

Data Summary: Composition of Organic Soluble Fraction Grouped by Chemical Class

Table 10A

Aliphatic Carboxylic Acids	CAS #	% w/w
2-methylacrylic acid	79-41-4	0.27
2-methylbutyric acid	116-53-0	0.04
fumaric acid	110-17-8	1.50
pentanoic acid	109-52-4	0.04
hexanoic acid	142-62-1	0.07
2-furancarboxylic acid	88-14-2	1.13
2-ethylhexanoic acid	149-57-5	0.02
4-oxo-pentanoic acid (levulinic acid)	123-76-2	1.94
α-hydroxyhexanoic acid	NA	0.23
octanoic acid	124-07-2	0.118
nonanoic acid	112-05-0	0.09
decanoic acid	334-48-5	0.11
dodecanoic acid (lauric acid)	143-07-7	1.09
10-undecenoic acid	112-38-9	0.01
nonanedioic acid	123-38-9	0.01
tetradecanoic acid (myristic acid)	544-63-8	1.05
pentadecanoic acid	1002084-2	0.12
hexadecanoic acid (palmitic acid)	57-10-3	9.82
α-hydroxylauric acid	NA	1.232
α-hydroxymyristic acid	2507-55-3	0.15
heptadecanoic acid	506-12-7	0.24
oleic acid	112-80-1	0.259
linoleic acid	60-33-3	12.26
stearic acid	57-11-4	3.43
palmitoleic acid	2091-29-4	0.01

Table 10B

Aromatic Carboxylic Acids		
benzoic acid	65-85-0	0.06
benzeneacetic acid	103-82-2	0.02
3,4-dichlorobenzoic acid	51-44-5	0.02
1,4-benzenedicarboxylic acid (terephthalic acid)	100-21-0	0.06
cinnamic acid	621-82-9	0.01
acetyl ferulic acid	2596-47-6	0.20

Table 10C

Esters		
glyceryl monoacetate	26446-35-5	0.08
glyceryl diacetate	25395-31-7	0.04
glyceryl triacetate (triacetin)	102-76-1	0.08
1,4-butanediol diacetate	628-67-1	0.04
2-hydroxy-5-methylfurfuryl acetate (HMF acetate)	10551-58-3	0.47
diethylphthalate (plasticizer)	84-66-2	0.10
dibutylphthalate (plasticizer)	84-74-2	0.21
di-2-ethylhexylphthalate (plasticizer)	117-81-7	11.70
tributylphosphate (plasticizer)	126-73-8	0.47
methyl laurate	111-82-0	0.14
methyl tridecanoate	1731-88-0	0.13
methyl pentadecanoate	7132-64-1	0.08
methyl palmitate	112-39-0	0.60
methyl heptadecanoate	1731-92-6	0.09
methyl linoleate	112-63-0	1.51
methyl stearate	112-61-8	0.07
methyl farnesate	10485-70-8	0.10
dodecyl acetate	112-66-3	0.17
tetradecyl acetate	638-59-5	0.06
hexadecyl acetate	629-70-9	0.18
benzyl benzoate	120-51-4	0.54
benzyl salicylate	118-58-1	0.13
methyl ester of 3,4-dimethoxy cinnamic acid	5396-64-5	0.01
unknown aromatic acetates	NA	0.16
mixture of long chain aliphatic acetates	NA	0.30
unknown benzoate	NA	0.06
unknown 378 m.w. aromatic acetate	NA	0.06

Table 10D

Phenolic Compounds		
phenol	108-95-2	0.09
2-hydroxy-3-methylbenzoic acid (cresotic acid, homosalicylic acid)	83-40-9	0.01
ferulic acid methyl ester	2309-07-1	0.01
benzyl salicylate	118-58-1	0.13
3,4-dihydro-4,8-dihydroxy-3-methylisocoumarin (6-hydroxymellein)	309-51-112	0.01
7-hydroxy-5-methoxy-2-methyl-4-oxo-4H-1-benzopyran-6-carboxaldehyde	7338-51-4	0.42
2,6-di-t-butyl-4-methylphenol (BHT, antioxidant)	128-37-0	0.34
2,6-di-t-butyl-p-methylanisole (antioxidant)	NA	0.20
2,4-bis-(dimethylbenzyl)-6-t-butylphenol (antioxidant)	NA	0.02
hydroquinone monoacetate	NA	0.15
4-hydroxy-3-methoxybenzaldehyde (vanillin)	121-33-5	0.01
p-coumaric acid methyl ester	3943-97-3	0.02
pentachlorophenol (PCP, wood preservative)	87-86-5	0.002
3-methyl-1,8,9-anthracenetriol (3-methylanthralin, Chrysarobin)	491-59-8	11.77
1,8-dihydroxy-3-methyl-9,10-anthracenedione (Chrysophanol, Chrysophanic acid, 1,8-dihydroxy-3-methyl-1,8-anthraquinone)	481-74-3	10.37
1,8-dihydroxy-3-(hydroxymethyl)-9,10-anthracenedione (Aloe-Emodin)	481-72-1	0.30
monoacetate derivative of 1,8-dihydroxy-3-(hydroxymethyl)-9,10-anthracenedione (Aloe-Emodin monoacetate)	NA	0.83
2,8-dihydroxy-3-methyl-1,4-naphthoquinone (Droserone)	NA	1.19
bis-flavanoids with m.w.'s 474 ($C_{23}H_{22}O_{11}$), 478 ($C_{22}H_{22}O_{12}$), 490 ($C_{23}H_{22}O_{12}$), 492 ($C_{23}H_{24}O_{12}$), 506 ($C_{23}H_{22}O_{13}$) and 508 ($C_{23}H_{24}O_{13}$) exact chemical structures unknown	NA	6.27 est. total for DP & LSIMS

Table 10E

Alcohols		
2-ethyl-1-hexanol	104-76-7	0.65
branched dodecanol isomer	NA	0.57
1-dodecanol (dodecyl alcohol)	112-53-8	5.69
1-tetradecanol (tetradecyl alcohol)	112-72-1	2.14
2-ethoxy-1-dodecanol	29718-44-3	2.57
1-hexadecanol (hexadecyl alcohol)	36653-82-4	0.05
2-ethoxy-1-tetradecanol	NA	1.09

Table 10F

Miscellaneous Compounds		
3,5,5-trimethyl-2-cyclohexene-1-one (isophorone)	78-59-1	0.06
2,3-dihydro-2,5-dimethyl-4H-1-benzopyran-4-one	69687-87-2	0.08
α-hexylcinnamic aldehyde	101-86-0	0.06
squalene	7683-64-9	0.03
1-chloro-dodecane (dodecyl chloride)	112-52-7	0.33
sulfur (elemental sulfur six membered ring)	NA	0.18
sulfur (S-8, cyclic sulfur, orthothrombic sulfur, molecular sulfur)	10544-50-0	0.90
unknown 138 m.w. sulfur-containing compound	NA	0.05
unknown 216 m.w. aromatic compound	NA	0.87
unknown 154 m.w. aromatic compound	NA	0.03
complex mixture of high molecular weight unknown compounds in the range 400-1000, many of these compounds are conjugates of the compounds identified in this study such as glycosides, polar conjugates, high m.w. esters etc.	NA	6.27 est. total for DP & LSIMS

Example 6 - *In vivo* Study. Application of the Treatment Solution to a Flaky Skin Mouse

The flaky skin mouse (*fsn*) is a genetically engineered mouse with an autosomal recessive mutation causing the skin to resemble that exhibited in human psoriasis (see Sundberg et al., *J. Vet. Diagn. Invest.* 4:312-17, 1992).

In the homozygous affected flaky skin mouse (*fsn/fsn*), where the mutation is on both chromosomes, histological features such as marked acanthosis, hyperkeratosis with focal parakeratosis, subcorneal pustules, dermal capillary dilation, and dermal infiltration of inflammatory cells are seen.

Ten affected mice (*fsn/fsn*) and 10 normal littermate controls (*fsn/-*) were obtained from The Jackson Laboratory in Bar Harbor, ME. The animals were maintained using standard diet and housing.

The dorsal surface of each animal was shaved. One-half of the dorsal surface received weekly topical treatments of the solution of Example 2, while the other half served as an untreated control. The solution of Example 2 was applied to the skin using a sterile cotton swab. Treatments continued for up to seven weeks. Weekly biopsies of treated and untreated areas were also removed for histological examination. Following the seventh week of treatment, the animals were necropsied for gross pathological changes.

The solution of Example 2 was found to induce dramatic gross and microscopic changes only for the hyperproliferative skin of the affected (*fsn/fsn*) mice with minimal to no effects noted for the (*fsn/-*) control mice. Observations by a veterinary dermatopathologist described the skin response of the affected animals as being similar to a "chemical burn." Histologic findings indicated that the keratinocyte growth of the affected mouse skin was markedly reduced, and that the treated skin began to slough off a bit but remained fully attached as a biological bandage allowing healing of the underlying skin. This effect was not observed in the control animals or untreated skin in the affected animals. Results are presented in Table 11.

Table 11

Summary of Flaky Skin Mouse Study

I.D. NUMBER	Phenotype	Histological Assessment	Gross Pathologic Changes	Comments
1 (fsn/fsn)	Flaky skin	Reduction in proliferation of keratinocytes	None observed	
2 (fsn/fsn)	Flaky skin	Reduction in proliferation of keratinocytes	None observed	
3 (fsn/fsn)	Flaky skin	Reduction in proliferation of keratinocytes	None observed	
4 (fsn/fsn)	Flaky skin	Reduction in proliferation of keratinocytes	None observed	
5 (fsn/fsn)	Flaky skin	Reduction in proliferation of keratinocytes	None observed	
6 (fsn/fsn)	Flaky skin	Reduction in proliferation of keratinocytes	None observed	
7 (fsn/fsn)	Flaky skin	Reduction in proliferation of keratinocytes	None observed	
8 (fsn/fsn)	Flaky skin	Reduction in proliferation of keratinocytes	None observed	
9 (fsn/fsn)	Flaky skin	Reduction in proliferation of keratinocytes	None observed	
10 (fsn/fsn)	Confusing phenotype	Marginal change	None observed	Jackson Labs suggest mistyping of animal
11 (+/-)	Normal skin	No change	None observed	
12 (+/-)	Normal skin	No change	None observed	
13 (+/-)	Normal skin	No change	None observed	
14 (+/-)	Normal skin	No change	None observed	
15 (+/-)	Normal skin	No change	None observed	
16 (+/-)	Normal skin	No change	None observed	
17 (+/-)	Normal skin	No change	None observed	
18 (+/-)	Normal skin	No change	None observed	
19 (+/-)	Normal skin	No change	None observed	
20 (+/-)	Normal skin	No change	None observed	

Example 7 - Bioassay - *In vivo* Study Bioassay

The *in vivo* study of Example 6 using the flaky skin mouse model was indicative of keratinocyte cell specifically with respect to the activity of the treatment solution compound.

In vitro cell testing is necessary to detect activity with respect to cell type for purposes of developing a bioassay for treatment solution activity, and second to further study results obtained using the flaky skin mice of Example 6. Because human skin contains both keratinocytes and fibroblasts, either of which may be involved in the psoriasis disease process, pure cultures of human fibroblasts were grown from normal adult human skin, keloid scars (hyperproliferative fibroblasts), and commercially available certified pure cultures of normal human adult epidermal keratinocytes. These cell types were tested separately for their growth responses to treatment with the treatment solution of Example 2.

Protocol

Cell growth is measured by examining the amounts of DNA synthesis, for as cells grow and divide, more DNA is produced. Radioactive thymidine is added to the cell culture media. The assay is conducted as follows: Cultured fibroblasts are grown in

complete minimal essential medium (CMEM) containing 10% fetal bovine serum as a growth factor source. Epidermal keratinocytes were cultured in the presence of complete keratinocyte growth medium (CKGM) supplemented with bovine pituitary extract, hydrocortisone, and epidermal growth factor (EGF) as a growth factor source.

Healthy growing cells were seeded into Corning 24 well tissue culture plates at a density of 1.0×10^4 cells per well in 1.0 ml of either CMEM or CKGM depending on cell type. The cells were incubated for 24-36 hours or until they reached 60-70% confluency at 37°C in the presence of 5% CO_2. The medium was then changed to either MEM without the 10% serum or KGM without hydrocortisone or ECF, but leaving the BPE in the media. This allows starvation of the cells, or their regression to a nongrowth phase where although they are not dividing, they remain

biochemically active. The cells were allowed to incubate under these conditions for 24 hours. The starving media were then removed and replaced with 1.0 ml/well of complete growth media CMEM or CKGM containing no treatment, treatment solution of Example 2, or a subfraction from Example 4 at a dilution of 1:5000, or solvent alone such as acetic acid or DMSO. Statistically significant numbers of repetitions were performed for each treatment. Additionally 1 μCi tritiated thymidine (^{3}H) was also added per well. Following these treatments, the cells were allowed to incubate for 24 hours using identical conditions as above. Following the end of the incubation period, the wells were washed 3 times with phosphate buffered saline (PBS) and fixed with 12.5% trichloroacetic acid (TCA) for 10 minutes followed by methanol for 10 minutes. The plates were air dried and the cells solubilized in 1.0 ml of 0.2 N NaOH at 37°C for 1 hour. Growth was determined by measuring the level of radioactivity present. This was accomplished by counting 0.9 ml of the solubilized cells in a scintillation counter.

Results

Fibroblasts

Fibroblasts from normal adult skin and keloid scar were cultured and assayed for effects of the treatment solution on growth as described above. Neither normal nor keloid fibroblasts were inhibited by the treatment solution. A typical graph for these experiments is shown in FIG. 24.

Keratinocytes

The treatment solution of Example 2 was fractioned as in Example 4, with the chemical compositions of those fractions analyzed in Example 5 and results shown in Tables 3-9 above.

Tables 12-14 summarize the percentages of the 4 main active ingredients in each of those fractions, and mean percentages of inhibition in the keratinocyte bioassay for each fraction. Finally, mean percentages of inhibition are normalized to the percentages of each active ingredient in the fractions mentioned above.

Table 12

Percentages of 4 Main Active Ingredients in the Treatment Solution of Example 2, Compiled from Tables 3-10

Fraction	FIG. 1 REF. NO.	3-methyl anthralin	chrysarobi	aloe-emodin	aloe-emodin monoacetate
XAD-2 Resin DCM Eluate	23	5.86%	11.76%	0.14%	2.23%
XAD-2 Resin MeOH Eluate-DCM-Insol.	26	27.82%	12.78%	0%	0%
Hydrolyzed Z-92 XAD Resin-MeOH Eluate DCM Insol.	29	0.42%	4.71%	0%	0%
Z-92 Carboxylic Acid Fx	28	0.55%	1.3%	0%	0%
Precipitate From Neutral/ Phenol Fx	36	19.69%	57.41%	0%	0%
Neutral/ Phenol Silica Gel MeOH Eluate	31	2.57%	5.7%	3.82%	1.34%
Neutral/ Phenol Silica Gel DCM Eluate	31	5.06%	15.00%	0%	6.24%
Crude Z-92	10	11.77%	10.37%	0.30%	0.83%

Table 13

Fraction Analysis Summary Results - % Growth Inhibition of Keratinocytes by Fraction

Fraction Ref. No. From FIG. 1	Mean% Inhibit.	7/12	7/21	7/28	8/3	8/28	9/14	9/15	10/6	10/13
23	62%			60%				64%		
26	50%	51%		44%				56%		
29	7%									7%
28	40%	51%		35%				35%		
36	63%				50%			76%		
31	30%				20%			39%		
31	92%				94%	99%	98%	80%	94%	89%
??	21%					17%			24%	
??	17%					15%			18%	
??	16%								16%	
10	77%			77%		79%	84%		69%	
??	94%							94%		

Table 14

Percent Inhibition per Percentage of Ingredient in Fraction for 4 Main Active Ingredients in the Treatment Solution of Example 2 (Calculated From Mean % Inhibition from Table 13)

Fraction Description From FIG. 1	Fraction Ref. No. From FIG. 1	3-methyl anthralin	chrysarobi	aloe-emodin	aloe-emodin monoacetate
XAD-2 Resin DCM Eluate	23	10.58%	5.27%	443%	28%
XAD-2 Resin MeOH Eluate-DCM-Insol.	26	1.79%	3.91%	0%	0%
Hydrolyzed Z-92 XAD Resin-MeOH Eluate DCM Insol.	29	16.66%	1.48%	0%	0%
Z-92 Carboxylic Acid Fx	28	72.72%	30.76%	0%	0%
Precipitate From Neutral/ Phenol Fx	36	3.19%	1.15%	0%	0%
Neutral/ Phenol Silica Gel MeOH Eluate	31	11.67%	5.26%	7.85%	22.38%
Neutral/ Phenol Silica Gel DCM Eluate	31	18.18%	6.13%	0%	14.74%
Crude Z-92	10	6.54%	7.42%	256.6%	92.77%

Example 8 - Neutralization Study

As the pH of the treatment solution of Example 2 is very acidic, studies were undertaken to neutralize the Ph to 7.0 in order to examine inhibitory properties in the neutral state. Crude treatment solution was adjusted to pH 7.0 with 1.0 N NaOH. Keratinocytes were assayed for growth in the presence of the neutralized extract using bioassay methodology as described above, except that neutralized treatment solution was added as the test compound at a dilution of 1:5000.

Results of this analysis indicated that neutralization removes activity of the treatment solution. While not wishing to be limited by theory, it is hypothesized that the addition of acetic acid during the preparation sequence for the treatment solution may acetylate reactive molecules, conferring additional biological activity. This may confer increased abilities to

enter cells, etc. Neutralization of such entities by raising the pH to 7.0 may render the active moieties inactive, as reflected by the dramatically decreased activity observed with these studies.

Example 9 - Protein Study

This Example examines whether or not any proteins were present in the treatment solution of Example 2. Toward this end, treatment solution was denatured at 65°C in the presence of sodium dodecyl sulfate (SDS) and electrophoresed on 12% polyacrylamide gels (PAGE) in the presence of SDS.

Following electrophoretic analysis and staining with Coomassie blue, no proteins were evident on visual inspection of the gel.

While the illustrative embodiments of the invention have been described with particularity, it will be understood that various other modifications will be apparent to and can be readily made by those skilled in the art without departing from the spirit and scope of the invention. Accordingly, it is not intended that the scope of the claims appended hereto be limited to the examples and descriptions set forth herein but rather that the claims be construed as encompassing all the features of patentable novelty that reside in the present invention, including all features that would be treated as equivalents thereof by those skilled in the art to which this invention pertains.

What is claimed is:

1. A composition for the treatment of psoriasis comprising an extract of an *Asphodelus Microcarpus* plant.

2. The composition recited in Claim 1, wherein the extract comprises an extract from a root portion of the *Asphodelus Microcarpus* plant.

3. The composition recited in Claim 2, further comprising acetic acid.

4. The composition recited in Claim 3, wherein the extract and the acetic acid are present in a volume proportion in the range of 1:20 to 20:1.

5. The composition recited in Claim 3, wherein the extract and the acetic acid are present in a volume proportion of 4:1.

6. The composition recited in Claim 5, further comprising brimstone.

7. A composition for the treatment of psoriasis comprising 3-methylanthralin, chrysophanol, aloe-emodin, and aloe-emodin monoacetate.

8. The composition recited in Claim 7, further comprising a derivative of at least one of the compounds 3-methylanthralin, chrysophanol, aloe-emodin, and aloe-emodin monoacetate.

9. A method for making a composition effective in the treatment of psoriasis comprising the steps of:

providing an *Asphodelus Microcarpus* plant; and

extracting a liquid from the plant, the liquid effective in the treatment of psoriasis.

10. The method recited in Claim 9, wherein the extracting step comprises extracting the liquid from a root of the plant.

11. The method recited in Claim 10, further comprising mixing the liquid with acetic acid.

12. The method recited in Claim 11, wherein the mixing step comprises mixing the liquid with acetic acid in a volume ratio in the range of 20:1 to 1:20.

13. The method recited in Claim 12, wherein the mixing step comprises mixing the liquid with acetic acid in a volume ratio of approximately 4:1.

14. The method recited in Claim 11, further comprising mixing the liquid-acetic acid mixture with brimstone.

15. A method for treating psoriasis in a mammal comprising the steps of:

providing an *Asphodelus Microcarpus* plant;

extracting a liquid from the plant; and

applying the liquid to an area of skin of the mammal affected by psoriasis.

16. The method recited in Claim 15, wherein the extracting step comprises extracting the liquid from a root of the plant.

17. The method recited in Claim 16, further comprising mixing the liquid with acetic acid.

18. The method recited in Claim 17, wherein the mixing step comprises mixing the liquid with acetic acid in a volume ratio in the range of 20:1 to 1:20.

19. The method recited in Claim 18, wherein the mixing step comprises mixing the liquid with acetic acid in a volume ratio of approximately 4:1.

20. The method recited in Claim 17, further comprising mixing the liquid-acetic acid mixture with brimstone.

21. The method recited in Claim 16, wherein the extracting step comprises extracting a liquid comprising the compounds 3-methylanthralin, chrysophanol, aloe-emodin, and aloe-emodin monoacetate.

22. The method recited in Claim 17, wherein the applying step comprises applying the mixture to the affected area of skin once per day for a duration sufficient to alleviate the symptoms of psoriasis.

23. The method recited in Claim 22, wherein the duration comprises a range of 14 to 56 days.

24. The method recited in Claim 15, wherein the extracting step comprises extracting a liquid comprising the compounds 3-methylanthralin, chrysophanol, aloe-emodin, and aloe-emodin monoacetate.

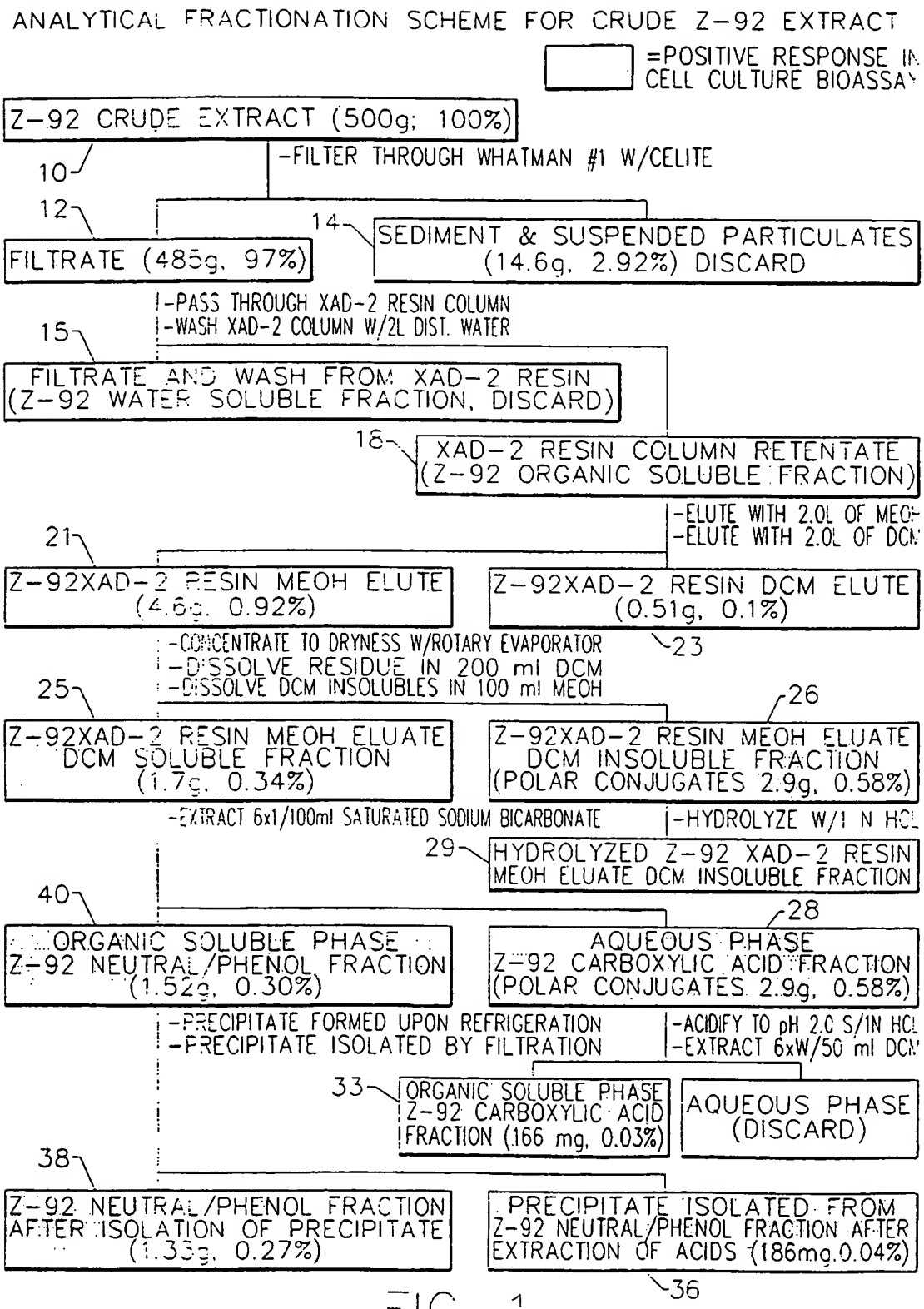
ANALYTICAL FRACTIONATION SCHEME FOR CRUDE Z-92 EXTRACT
=POSITIVE RESPONSE IN CELL CULTURE BIOASSAY
Z-92 CRUDE EXTRACT (500g; 100%)
10
-FILTER THROUGH WHATMAN #1 W/CELITE
12
FILTRATE (485g, 97%)
14
SEDIMENT & SUSPENDED PARTICULATES (14.6g, 2.92%) DISCARD
-PASS THROUGH XAD-2 RESIN COLUMN
-WASH XAD-2 COLUMN W/2L DIST. WATER
15
FILTRATE AND WASH FROM XAD-2 RESIN (Z-92 WATER SOLUBLE FRACTION, DISCARD)
18
XAD-2 RESIN COLUMN RETENTATE (Z-92 ORGANIC SOLUBLE FRACTION)
-ELUTE WITH 2.0L OF MEOH
-ELUTE WITH 2.0L OF DCM
21
Z-92XAD-2 RESIN MEOH ELUTE (4.6g, 0.92%)
Z-92XAD-2 RESIN DCM ELUTE (0.51g, 0.1%)
23
-CONCENTRATE TO DRYNESS W/ROTARY EVAPORATOR
-DISSOLVE RESIDUE IN 200 ml DCM
-DISSOLVE DCM INSOLUBLES IN 100 ml MEOH
25
Z-92XAD-2 RESIN MEOH ELUATE DCM SOLUBLE FRACTION (1.7g, 0.34%)
26
Z-92XAD-2 RESIN MEOH ELUATE DCM INSOLUBLE FRACTION (POLAR CONJUGATES 2.9g, 0.58%)
-EXTRACT 6x1/100ml SATURATED SODIUM BICARBONATE
-HYDROLYZE W/1 N HCl
29
HYDROLYZED Z-92 XAD-2 RESIN MEOH ELUATE DCM INSOLUBLE FRACTION
40
ORGANIC SOLUBLE PHASE Z-92 NEUTRAL/PHENOL FRACTION (1.52g, 0.30%)
28
AQUEOUS PHASE Z-92 CARBOXYLIC ACID FRACTION (POLAR CONJUGATES 2.9g, 0.58%)
-PRECIPITATE FORMED UPON REFRIGERATION
-PRECIPITATE ISOLATED BY FILTRATION
-ACIDIFY TO pH 2.0 S/1N HCl
-EXTRACT 6xW/50 ml DCM
33
ORGANIC SOLUBLE PHASE Z-92 CARBOXYLIC ACID FRACTION (166 mg, 0.03%)
AQUEOUS PHASE (DISCARD)
38
Z-92 NEUTRAL/PHENOL FRACTION AFTER ISOLATION OF PRECIPITATE (1.33g, 0.27%)
PRECIPITATE ISOLATED FROM Z-92 NEUTRAL/PHENOL FRACTION AFTER EXTRACTION OF ACIDS (186mg,0.04%)
36

FIG. 1.

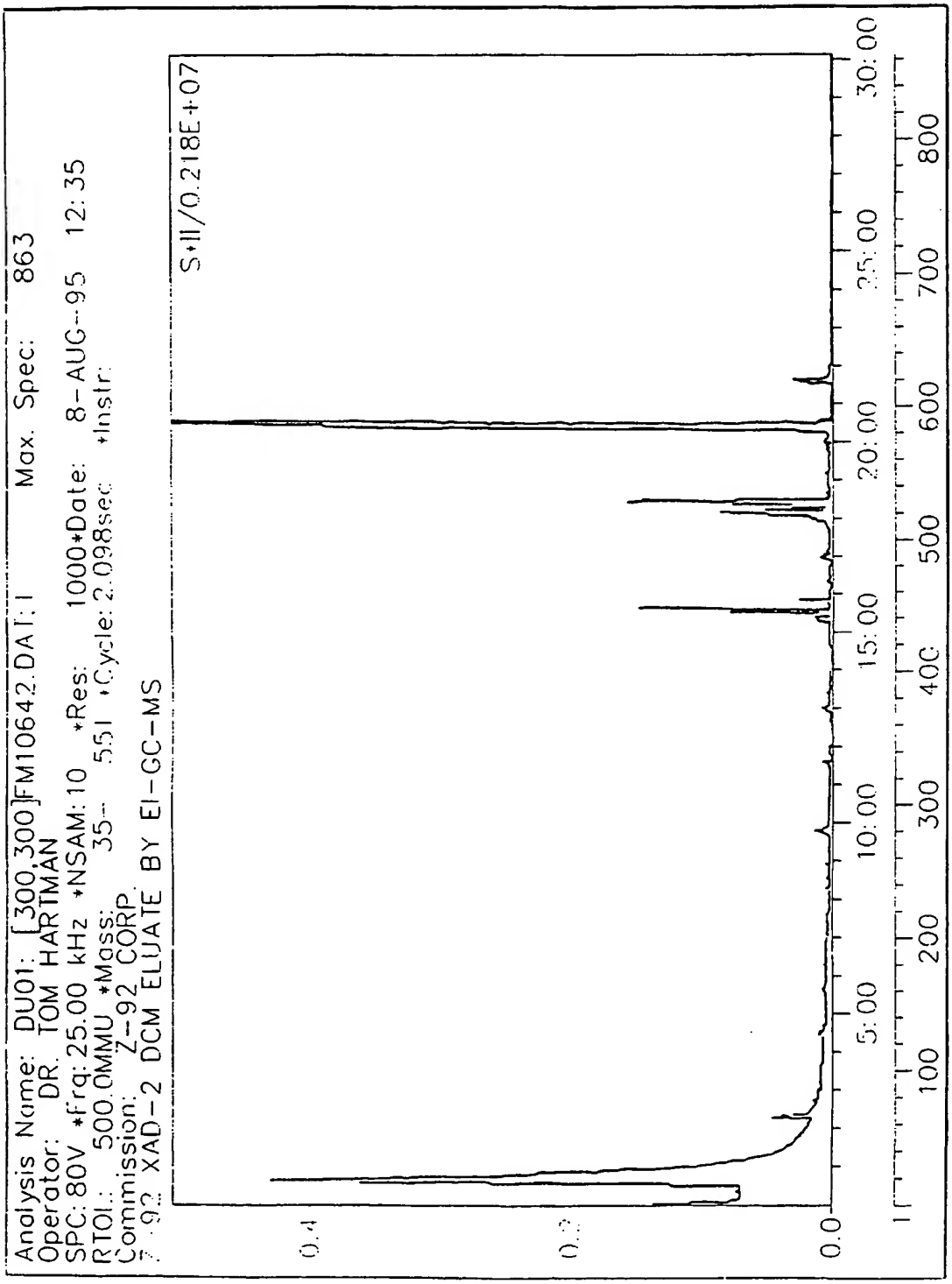
Analysis Name: DU01: [300,300]FM10642.DAT;1 Max. Spec: 863
Operator: DR. TOM HARTMAN
SPC: 80V *Frq: 25.00 kHz *NSAM: 10 *Res: 1000*Date: 8-AUG-95 12:35
RTOI: 500.0MMU *Mass: 35- 551 *Cycle: 2.098sec *Instr:
Commission: Z-92 CORP.
Z-92 XAD-2 DCM ELUATE BY EI-GC-MS
S+11/0.218E+07
0.4
0.2
0.0
5:00
10:00
15:00
20:00
25:00
30:00
100
200
300
400
500
600
700
800

FIG. 2.

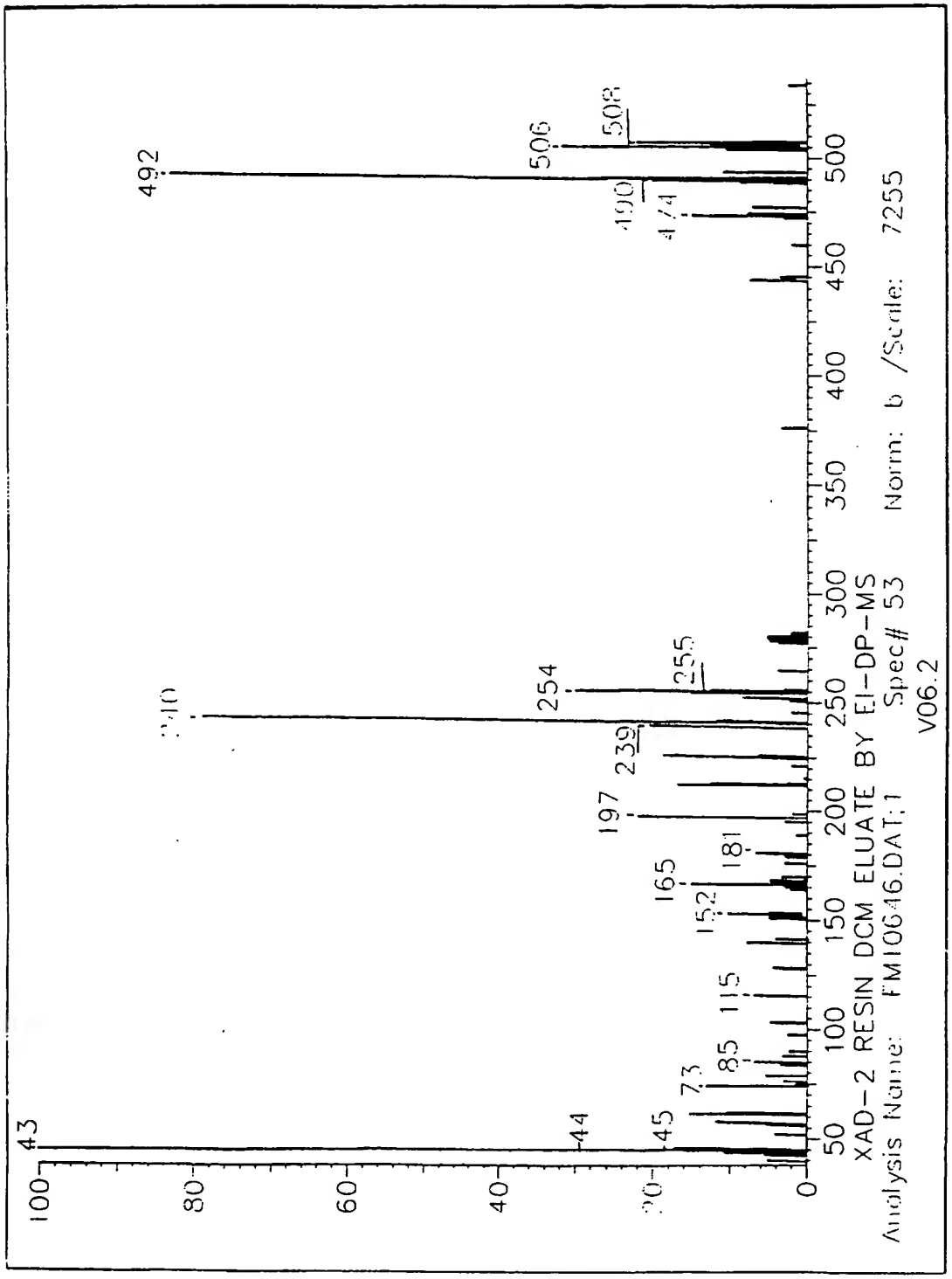
XAD-2 RESIN DCM ELUATE BY EI-DP-MS
Analysis Name: FM10646.DAT;1 Spec# 53 Norm: b /Scale: 7255
V06.2
43
44
45
73
85
115
152
165
181
197
239
254
255
492
506
508

FIG. 3.

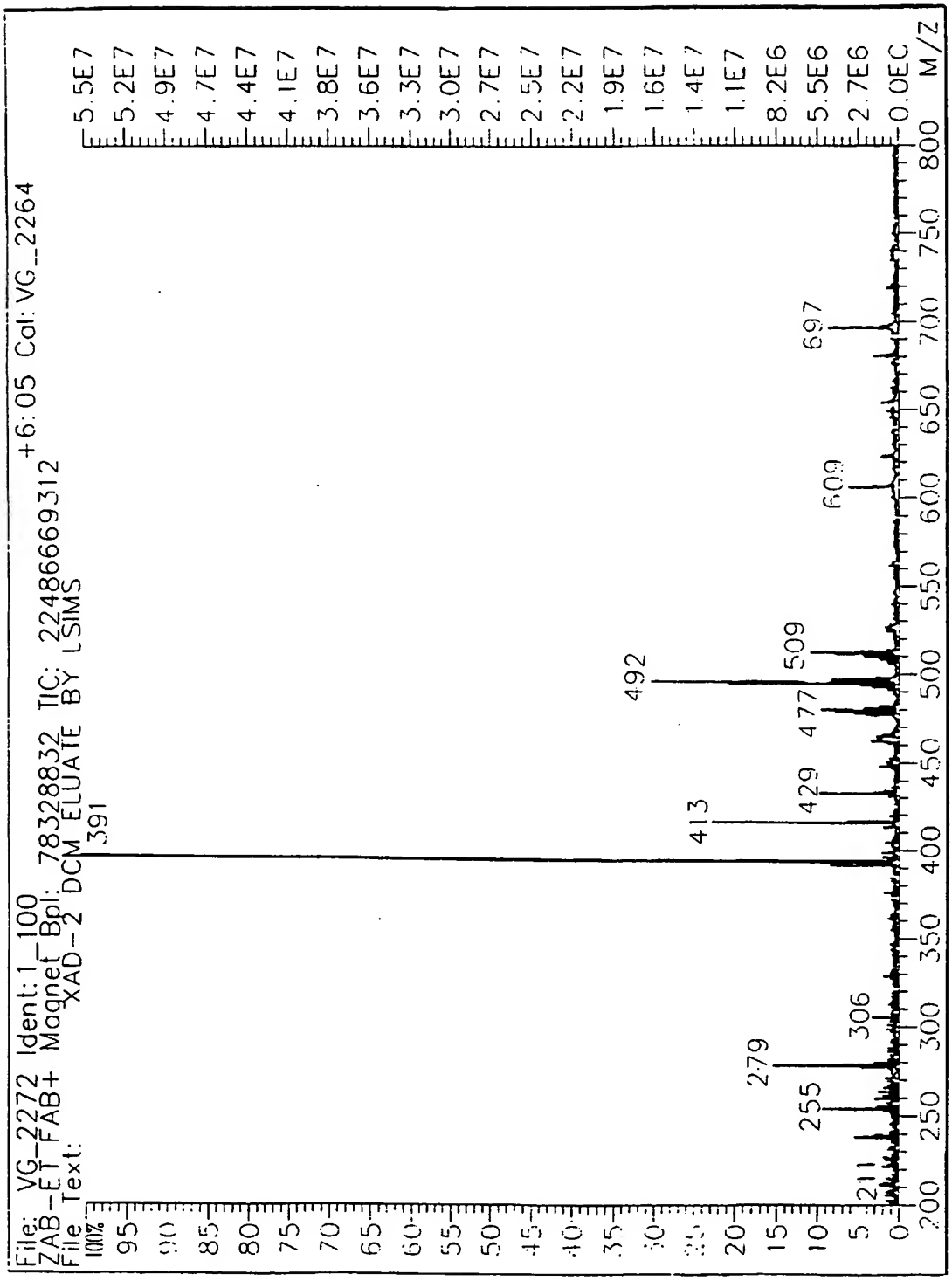
File: VG_2272 Ident:1_100
ZAB-ET FAB+ Magnet Bpl: 78328832 TIC: 22486669312
File Text: XAD-2 DCM ELUATE BY LSIMS
+6:05 Cal:VG_2264
100%
M/Z
391
413
492
509
429
477
609
697
279
255
306
211

FIG. 4.

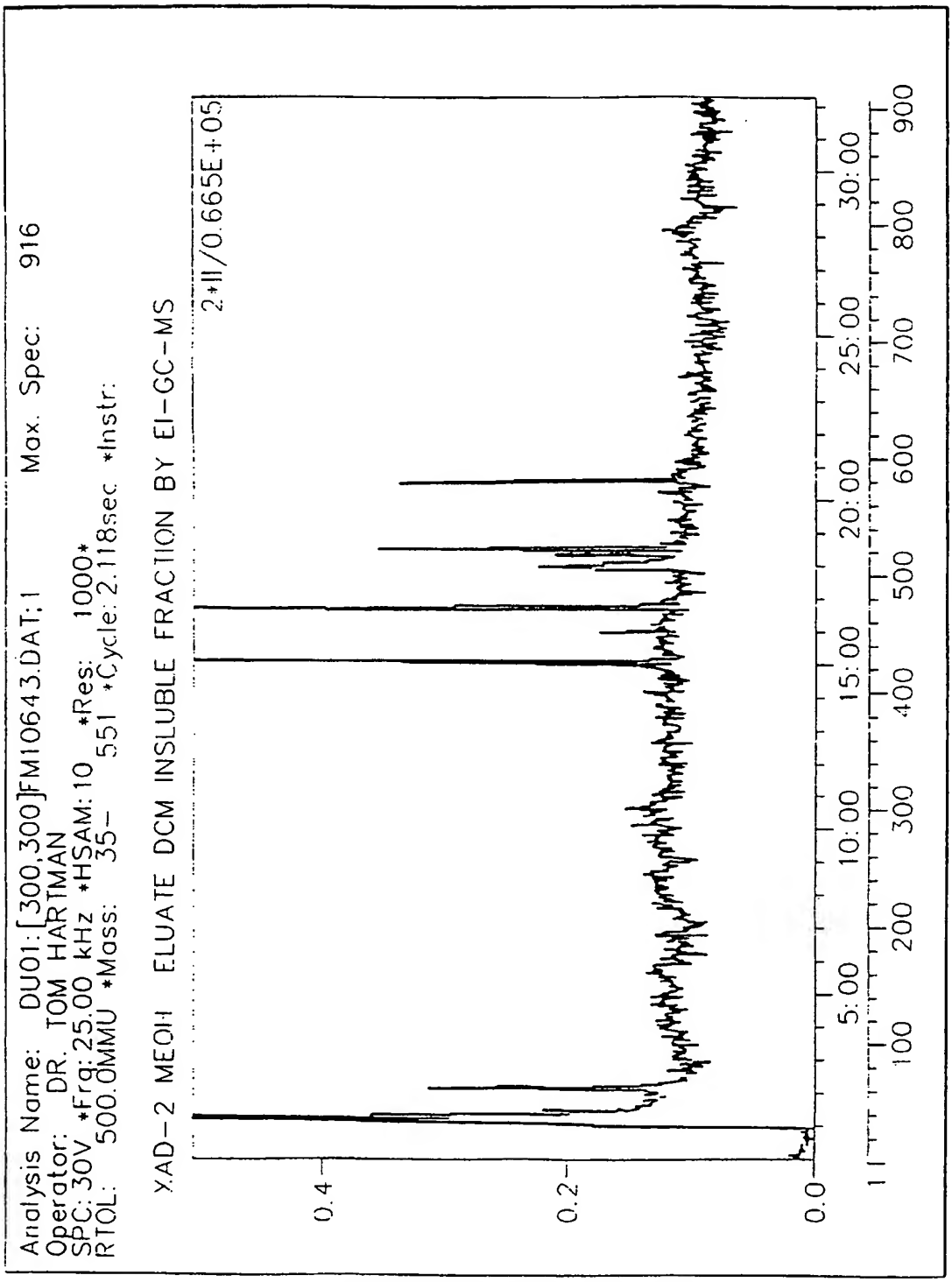
Analysis Name: DU01:[300,300]FM10643.DAT;1
Operator: DR. TOM HARTMAN
SPC: 30V *Frq: 25.00 kHz *HSAM: 10 *Res: 1000*
RTOL: 500.0MMU *Mass: 35- 551 *Cycle: 2.118sec *Instr:
Max. Spec: 916
XAD-2 MEOH ELUATE DCM INSLUBLE FRACTION BY EI-GC-MS
2*11/0.665E+05
0.4
0.2
0.0
5:00
10:00
15:00
20:00
25:00
30:00
100
200
300
400
500
600
700
800
900

FIG. 5.

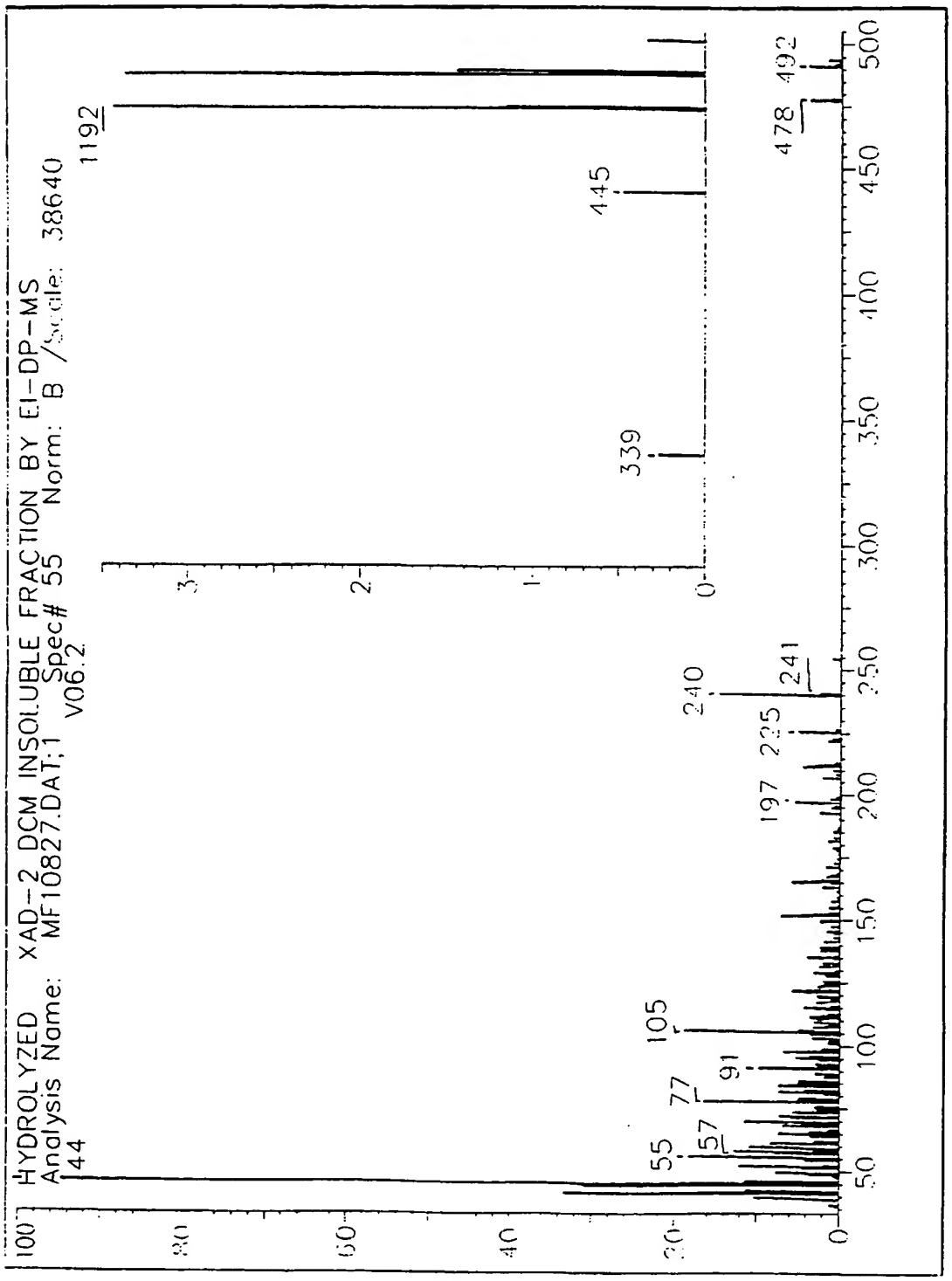
HYDROLYZED XAD-2 DCM INSOLUBLE FRACTION BY EI-DP-MS
Analysis Name: MF10827.DAT;1 Spec# 55 Norm: B /Scale: 38640
V06.2
44
55
57
77
91
105
197
225
240
241
339
445
478
492
1192

FIG. 6.

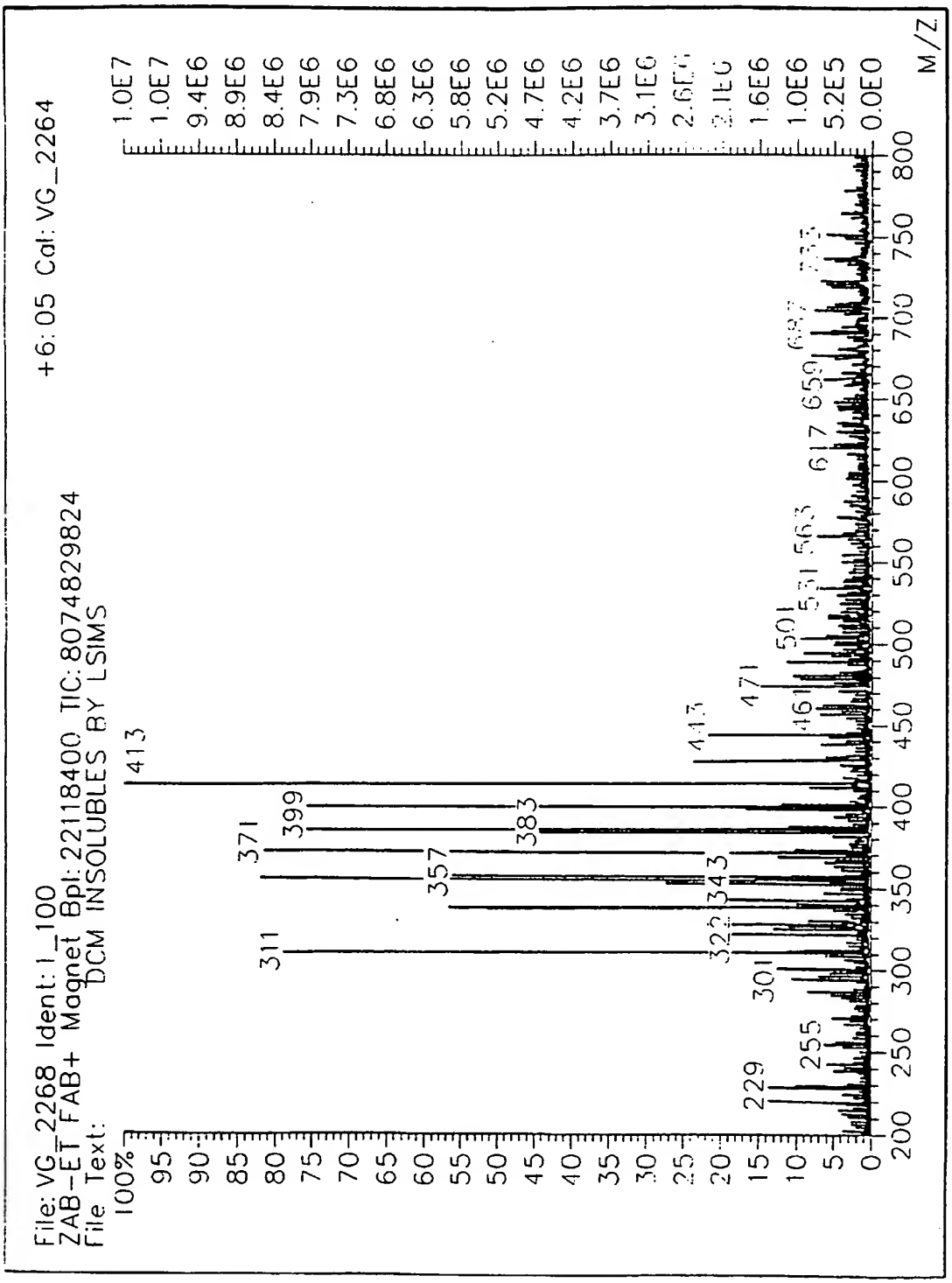
File: VG_2268 Ident: 1_100
ZAB-ET FAB+ Magnet Bpl: 22118400 TIC: 8074829824
File Text: DCM INSOLUBLES BY LSIMS
+6:05 Cal: VG_2264
100%
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
200 250 300 350 400 450 500 550 600 650 700 750 800
M/Z
1.0E7
1.0E7
9.4E6
8.9E6
8.4E6
7.9E6
7.3E6
6.8E6
6.3E6
5.8E6
5.2E6
4.7E6
4.2E6
3.7E6
3.1E6
1.6E6
1.0E6
5.2E5
0.0E0
229
255
301
311
322
343
357
371
383
399
413
461
471
501
531
563
617
659

FIG. 7.

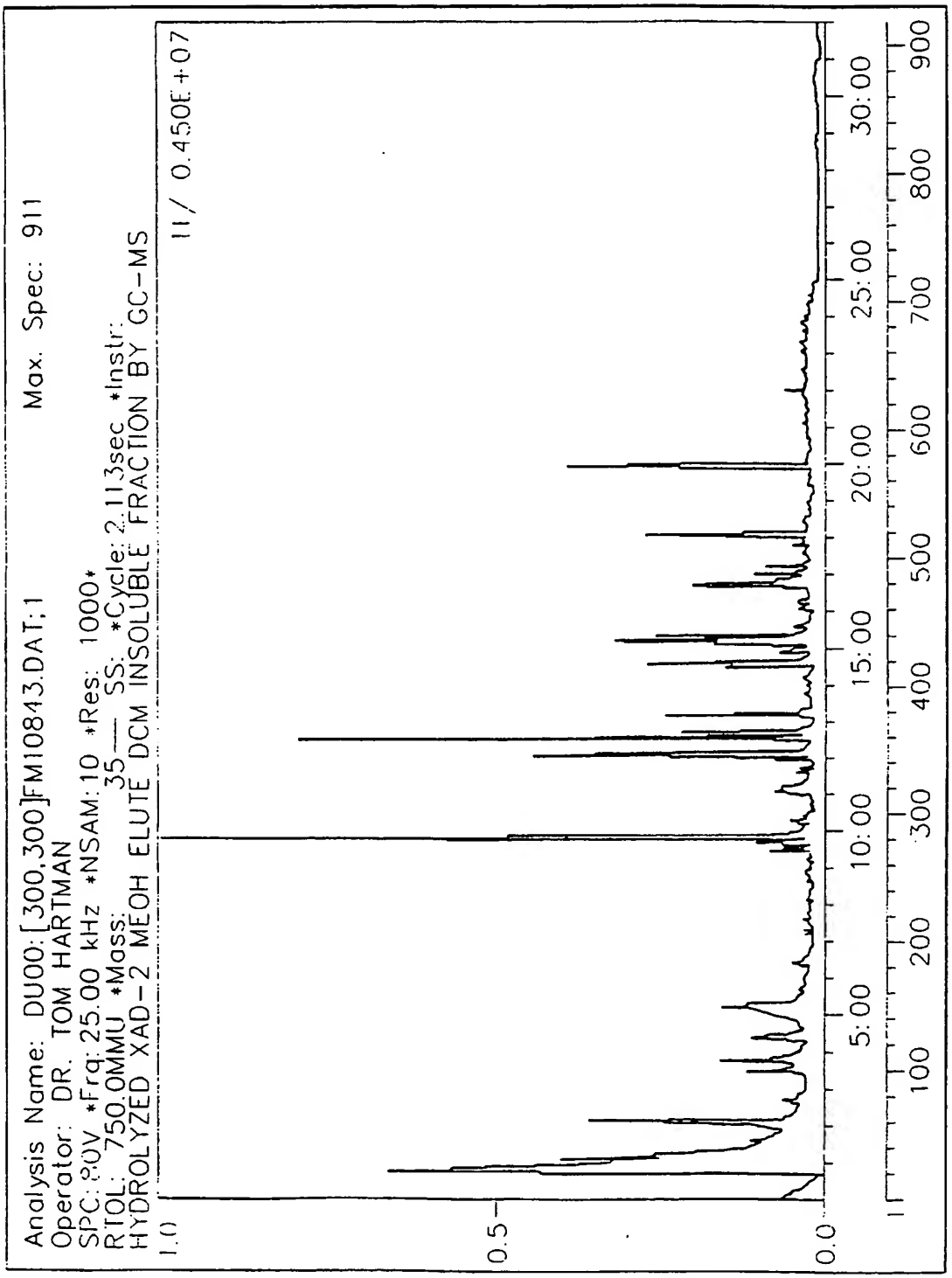
Analysis Name: DU00:[300,300]FM10843.DAT;1
Operator: DR. TOM HARTMAN
SPC: 80V *Frq: 25.00 kHz *NSAM: 10 *Res: 1000*
RTOL: 750.0MMU *Mass: 35— SS: *Cycle: 2.113sec *Instr:
HYDROLYZED XAD-2 MEOH ELUTE DCM INSOLUBLE FRACTION BY GC-MS
Max. Spec: 911
11/ 0.450E+07
1.0
0.5
0.0
5:00
10:00
15:00
20:00
25:00
30:00
100
200
300
400
500
600
700
800
900

FIG. 8.

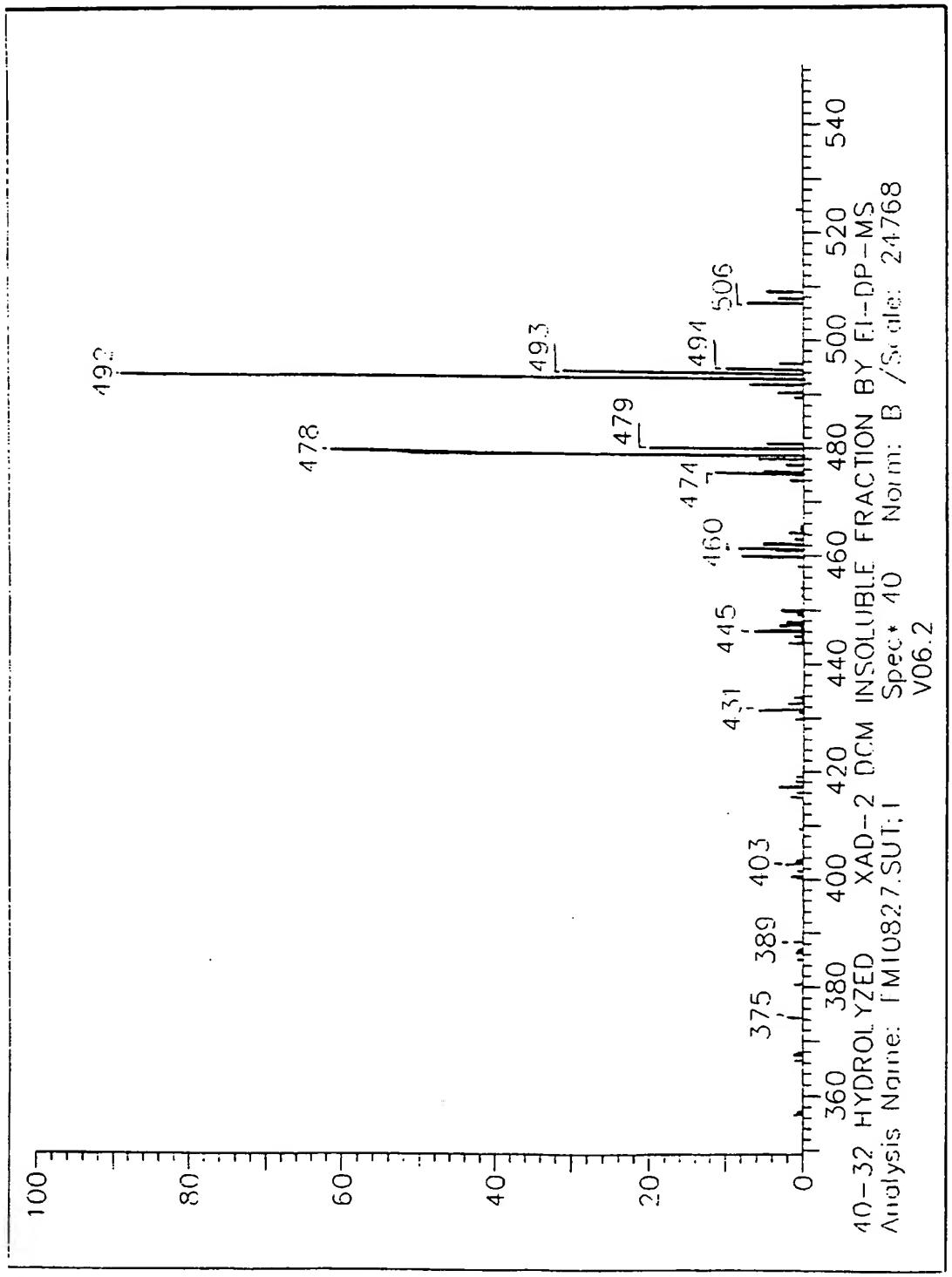
40-32 HYDROLYZED XAD-2 DCM INSOLUBLE FRACTION BY FI-DP-MS
Analysis Name: FM100827.SUT;1 Spec* 40 Norm: B /Scale: 24768
V06.2
100
80
60
40
20
0
360
380
400
420
440
460
480
500
520
540
375
389
403
431
445
460
474
478
479
492
493
491
506

FIG. 9.

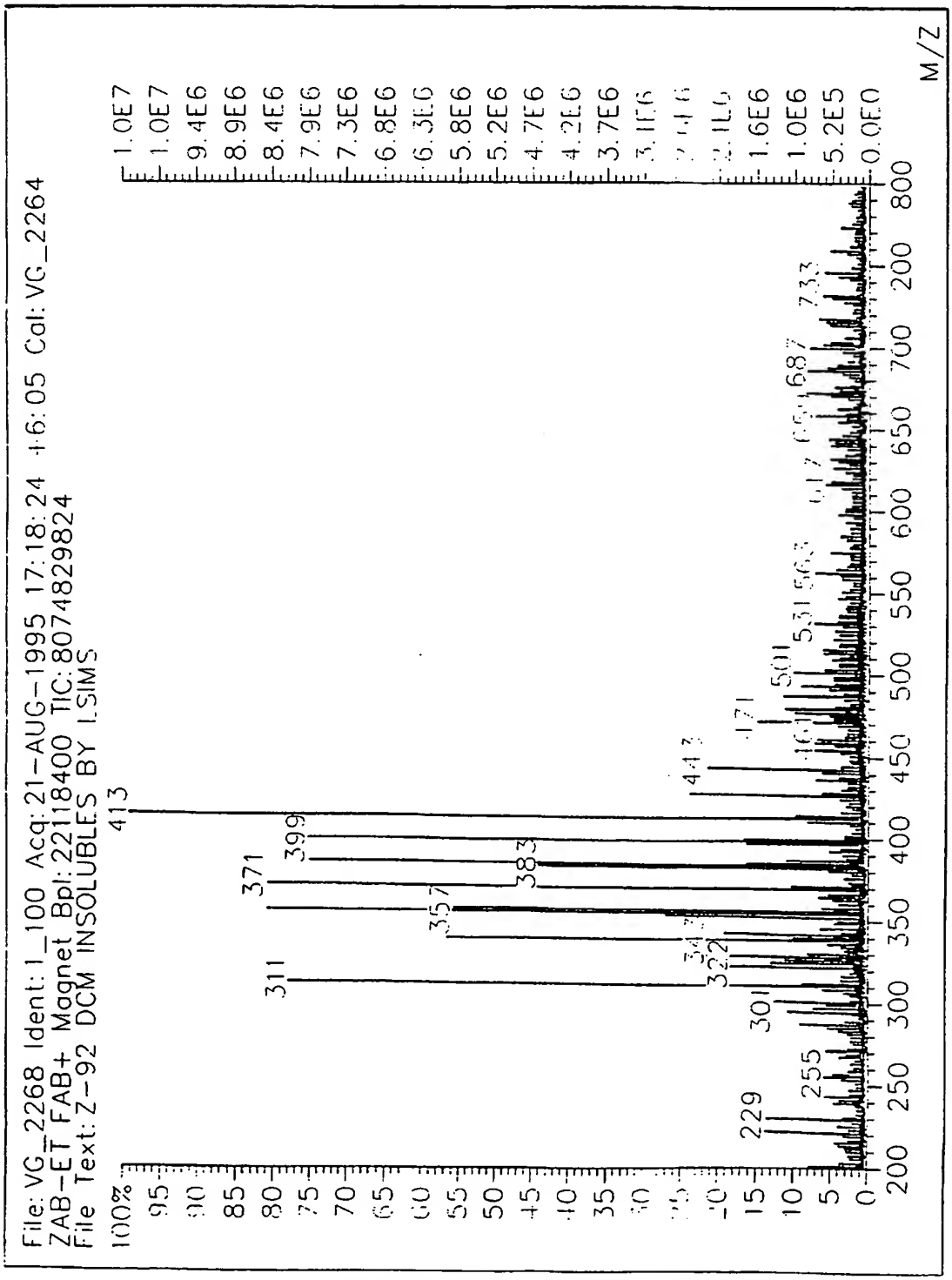
File: VG_2268 Ident: 1_100 Acq: 21-AUG-1995 17:18:24 16:05 Cal: VG_2264
ZAB-ET FAB+ Magnet Bpl: 22118400 TIC: 8074829824
File Text: Z-92 DCM INSOLUBLES BY LSIMS
100%
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1.0E7
1.0E7
9.4E6
8.9E6
8.4E6
7.9E6
7.3E6
6.8E6
6.3E6
5.8E6
5.2E6
4.7E6
4.2E6
3.7E6
1.6E6
1.0E6
5.2E5
0.0E0
200 250 300 350 400 450 500 550 600 650 700 800
M/Z
229
255
301
311
322
357
371
383
399
413
443
471
501
687
733

FIG. 10.

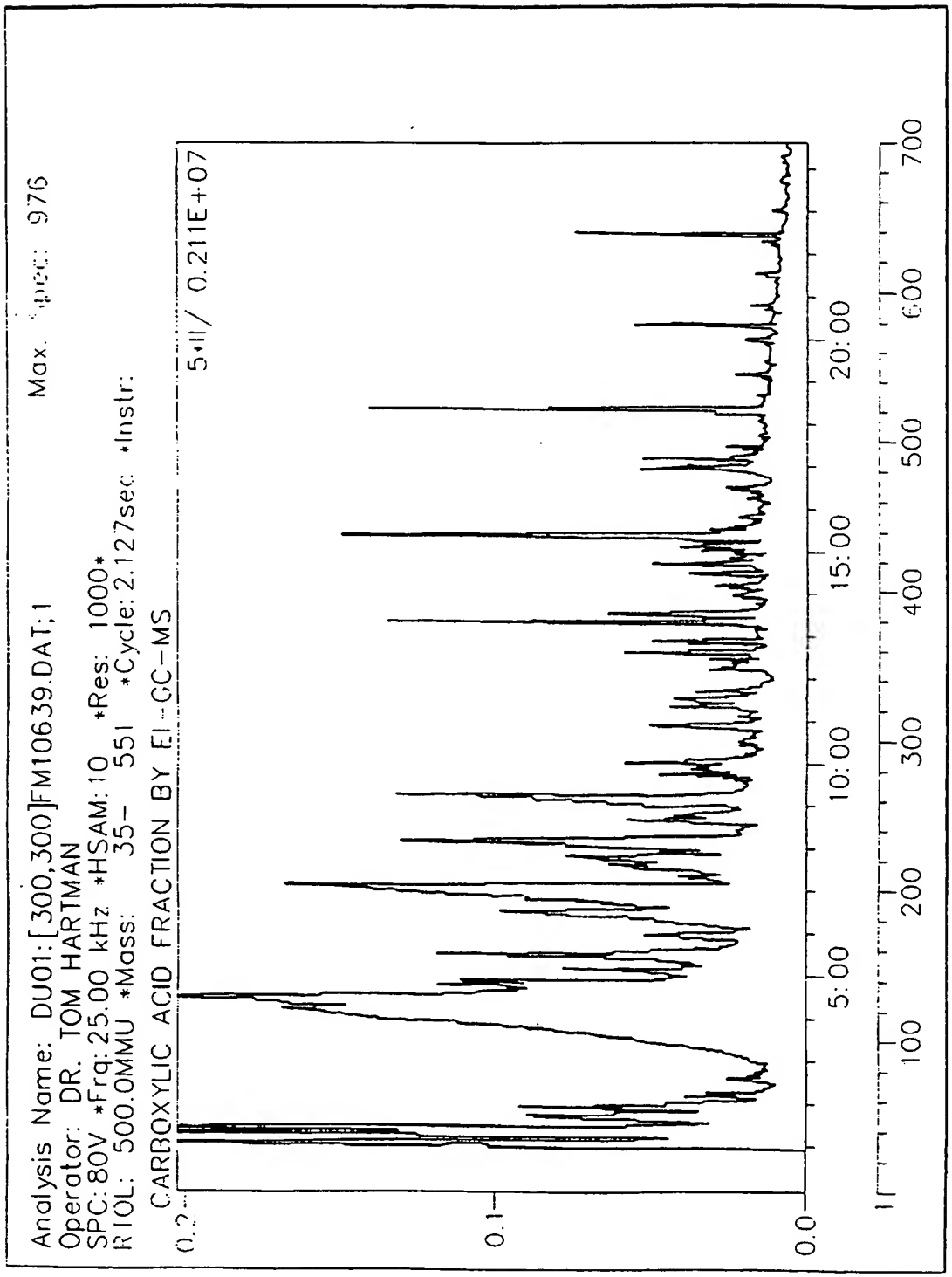
Analysis Name: DU01:[300,300]FM10639.DAT;1
Operator: DR. TOM HARTMAN
SPC: 80V *Frq: 25.00 kHz *HSAM: 10 *Res: 1000*
R10L: 500.0MMU *Mass: 35- 551 *Cycle: 2.127sec *Instr:
CARBOXYLIC ACID FRACTION BY EI--GC-MS
Max. Spec: 976
5+11/ 0.211E+07
0.2
0.1
0.0
5:00
10:00
15:00
20:00
100
200
300
400
500
600
700

FIG. 11.

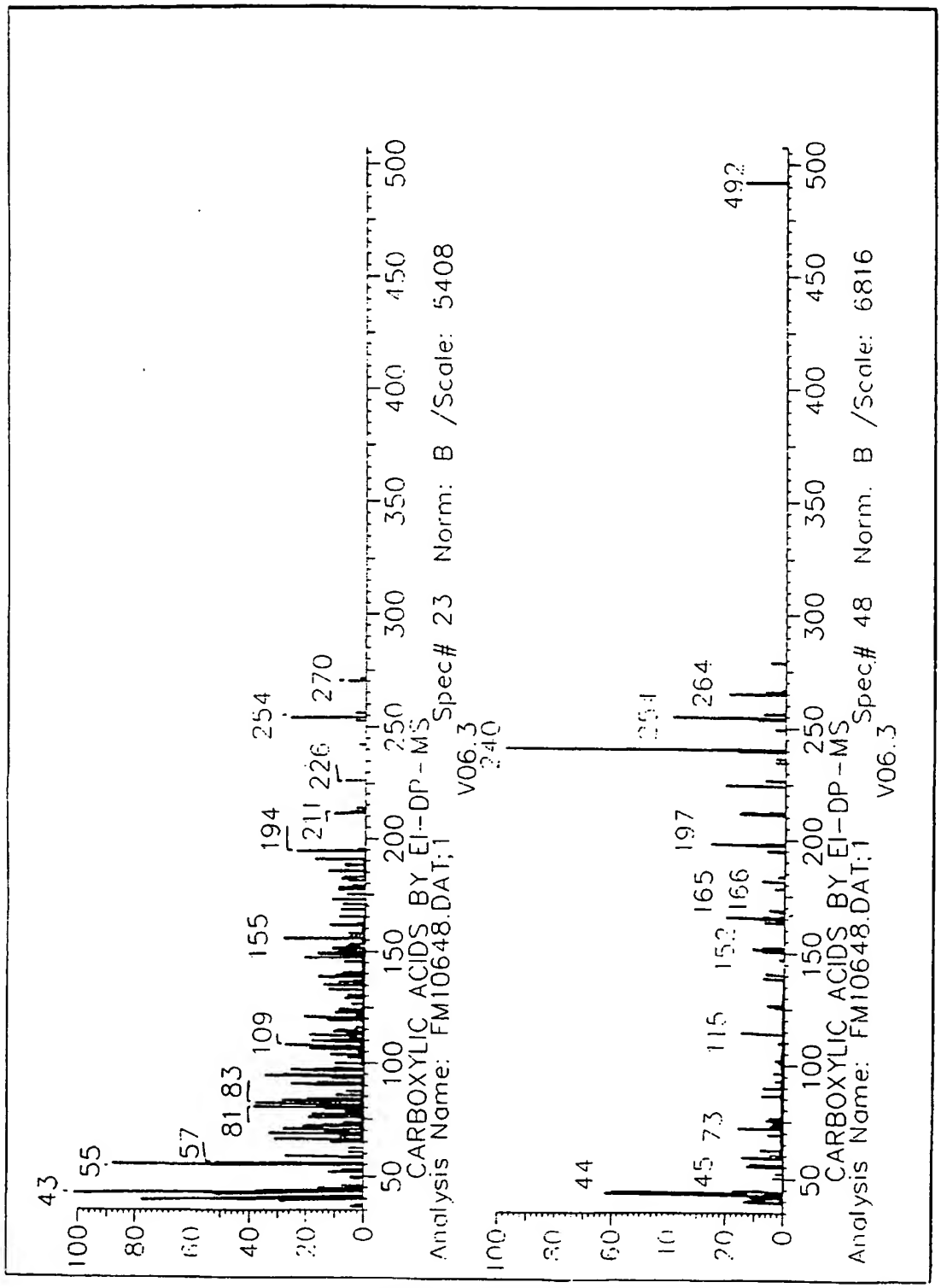
CARBOXYLIC ACIDS BY EI-DP-MS
Analysis Name: FM10648.DAT;1
Spec# 23 Norm: B /Scale: 5408
V06.3
CARBOXYLIC ACIDS BY EI-DP-MS
Analysis Name: FM10648.DAT;1
Spec# 48 Norm. B /Scale: 6816
V06.3

FIG. 12.

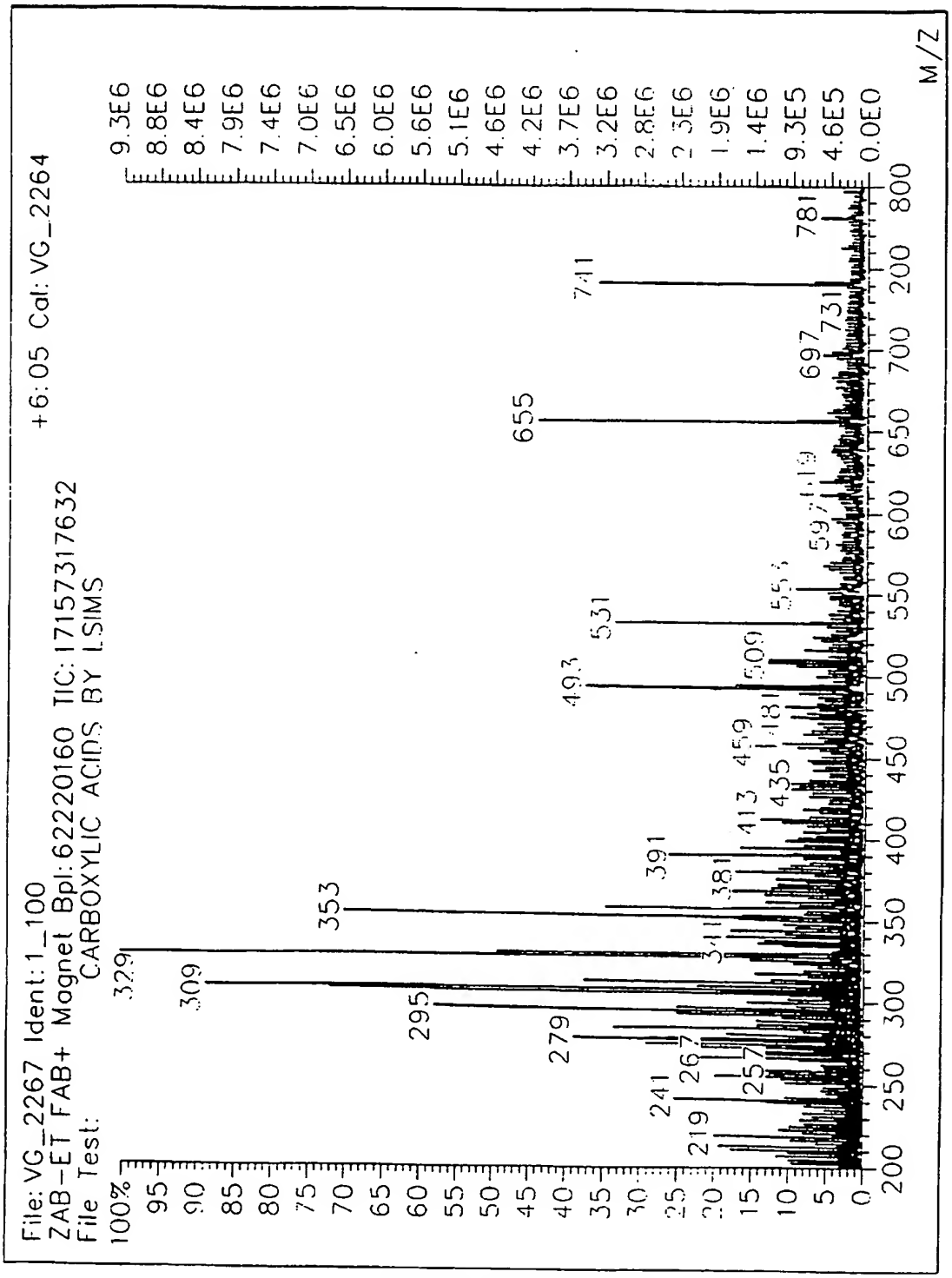
File: VG_2267 Ident: 1_100
ZAB-ET FAB+ Magnet Bpl: 62220160 TIC: 17157317632
File Test: CARBOXYLIC ACIDS BY LSIMS
+6: 05 Cal: VG_2264
100%
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
9.3E6
8.8E6
8.4E6
7.9E6
7.4E6
7.0E6
6.5E6
6.0E6
5.6E6
5.1E6
4.6E6
4.2E6
3.7E6
3.2E6
2.8E6
2.3E6
1.9E6
1.4E6
9.3E5
4.6E5
0.0E0
200 250 300 350 400 450 500 550 600 650 700 200 800
M/Z
329
309
295
279
267
257
241
219
353
391
381
413
459
435
493
531
655
697
731
781

FIG. 13.

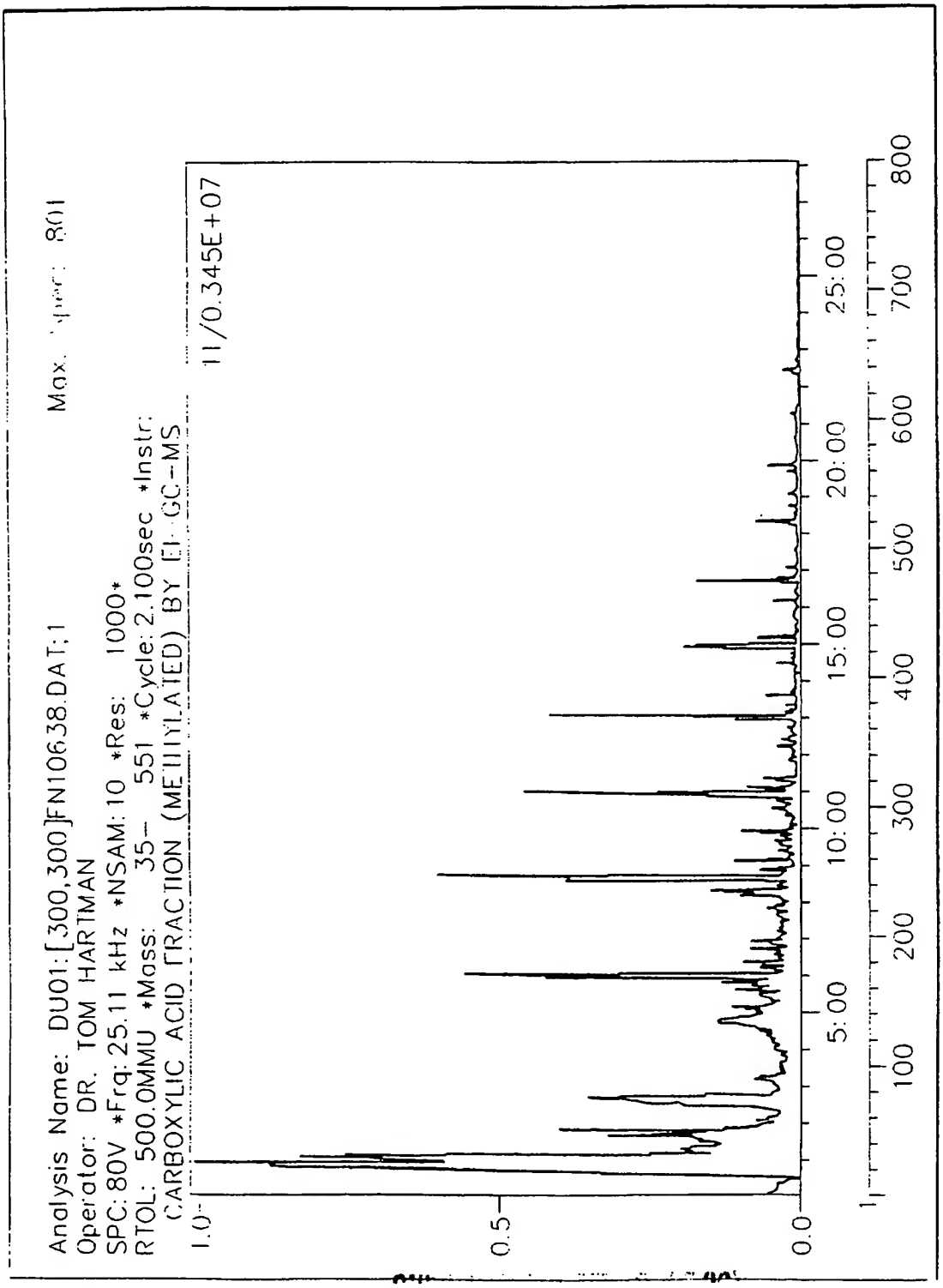
Analysis Name: DU01:[300,300]FN10638.DAT;1
Operator: DR. TOM HARTMAN
SPC: 80V *Frq:25.11 kHz *NSAM:10 *Res: 1000*
RTOL: 500.0MMU *Mass: 35- 551 *Cycle:2.100sec *Instr:
CARBOXYLIC ACID FRACTION (METHYLATED) BY EI GC-MS
Max. Spec: 801
11/0.345E+07
1.0
0.5
0.0
100
200
300
400
500
600
700
800
5:00
10:00
15:00
20:00
25:00

FIG. 14.

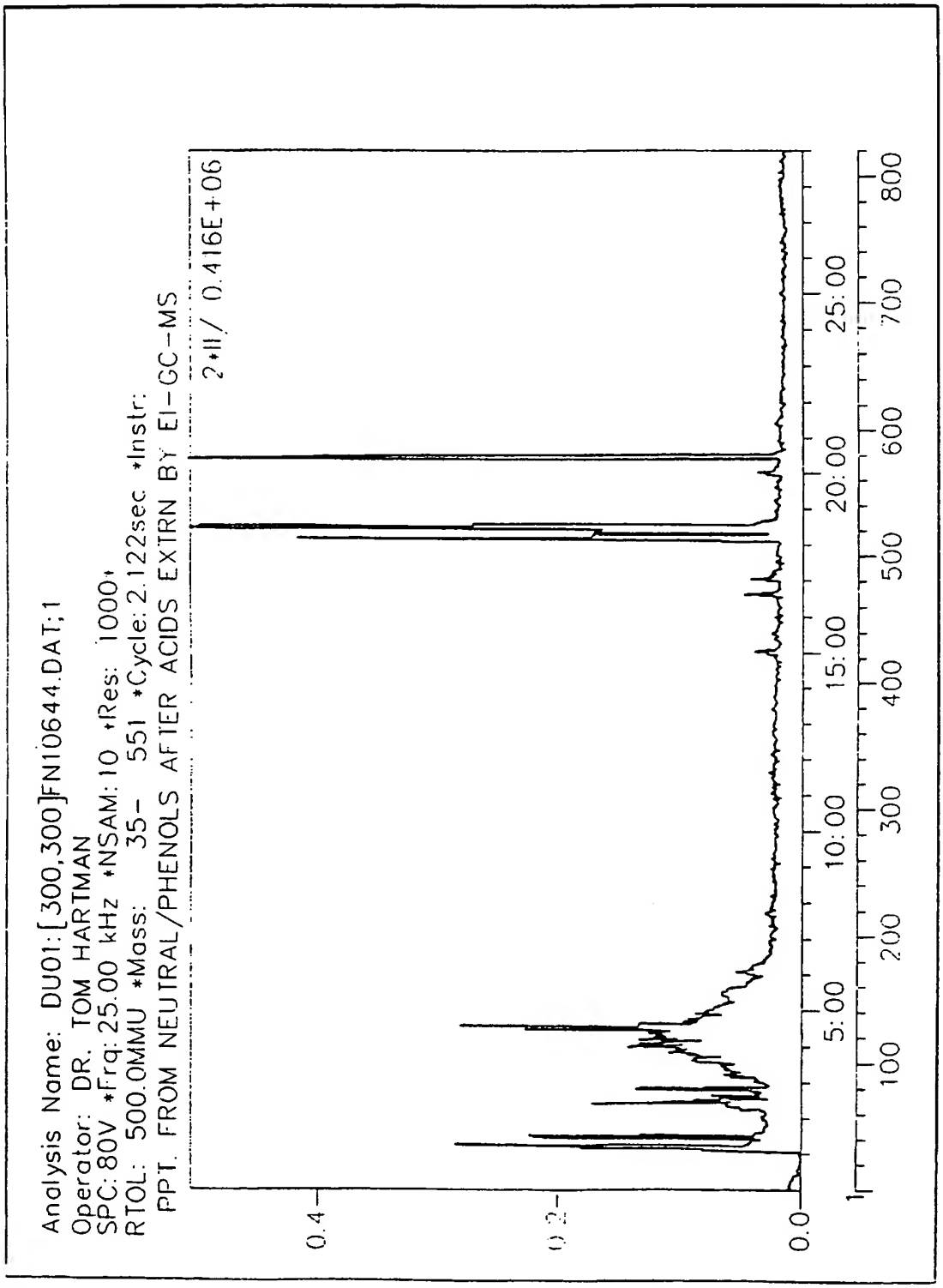
Analysis Name: DU01:[300,300]FN10644.DAT;1
Operator: DR. TOM HARTMAN
SPC: 80V *Frq: 25.00 kHz *NSAM: 10 *Res: 1000*
RTOL: 500.0MMU *Mass: 35- 551 *Cycle: 2.122sec *Instr:
PPT. FROM NEUTRAL/PHENOLS AFTER ACIDS EXTRN BY EI-GC-MS
2*11/ 0.416E+06
0.4
0.2
0.0
100
200
300
400
500
600
700
800
5:00
10:00
15:00
20:00
25:00

FIG. 15.

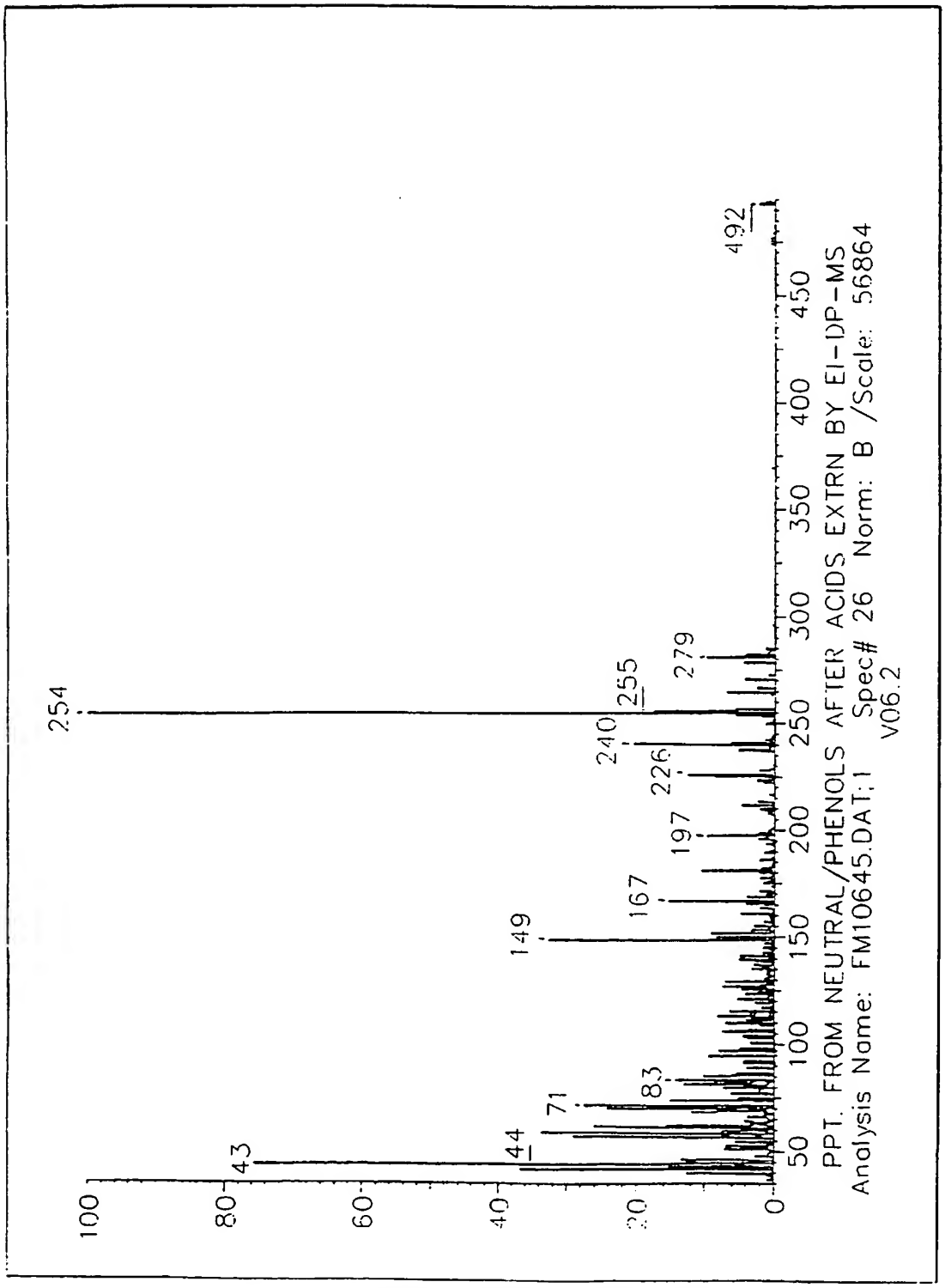
PPT. FROM NEUTRAL/PHENOLS AFTER ACIDS EXTRN BY EI-DP-MS
Analysis Name: FM10645.DAT;1 Spec# 26 Norm: B /Scale: 56864
V06.2
100
80
60
40
20
0
50
100
150
200
250
300
350
400
450
43
44
71
83
149
167
197
226
240
254
255
279
492

FIG. 16.

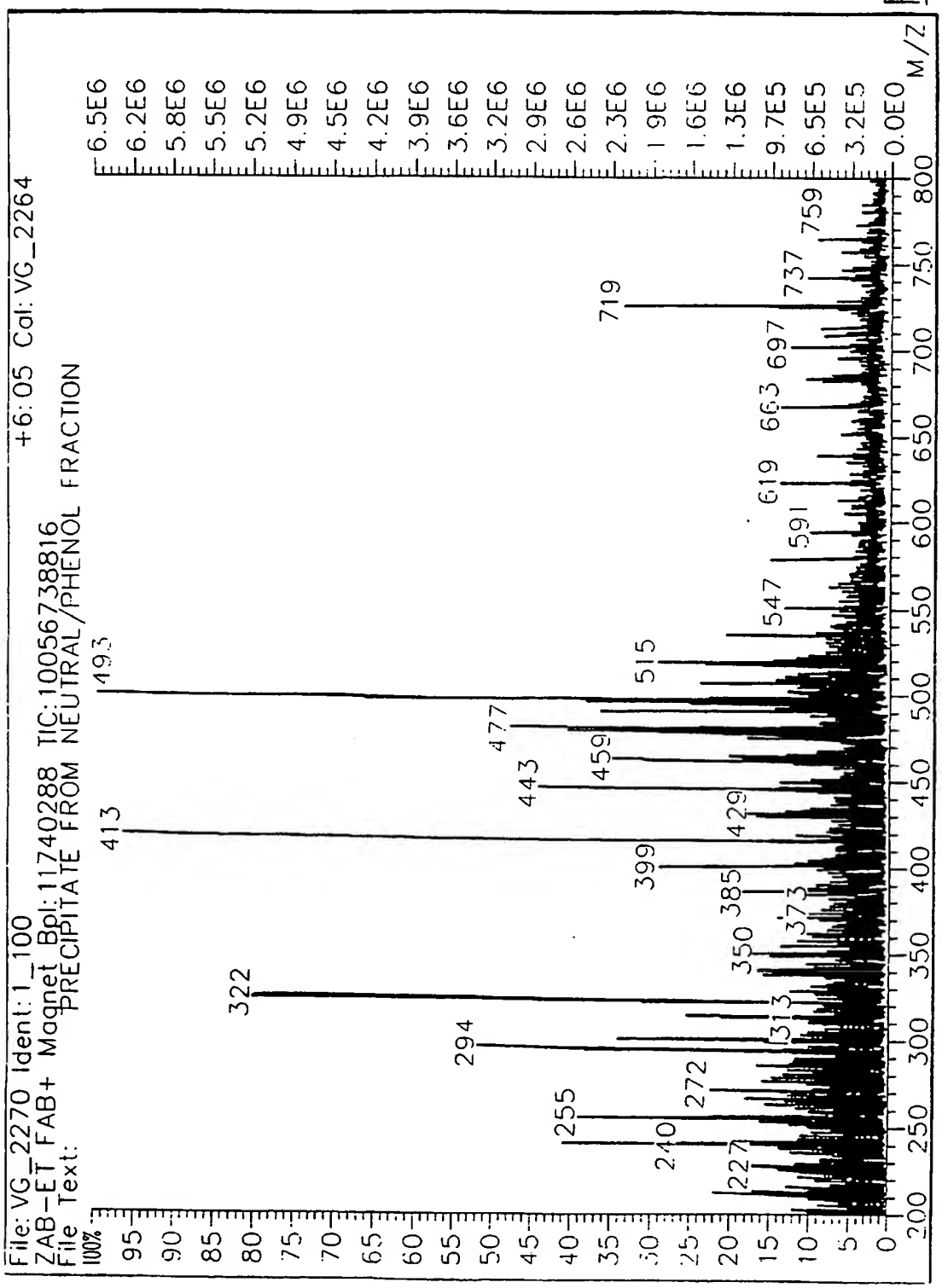
File: VG_2270 Ident: 1_100
ZAB-ET FAB+ Magnet Bpl: 11740288 TIC: 100567388816
File Text: PRECIPITATE FROM NEUTRAL/PHENOL FRACTION
+6:05 Cal: VG_2264
100%
M/Z
322
294
255
240
227
272
313
350
373
385
399
413
429
443
459
477
493
515
547
591
619
663
697
719
737
759

FIG. 17.

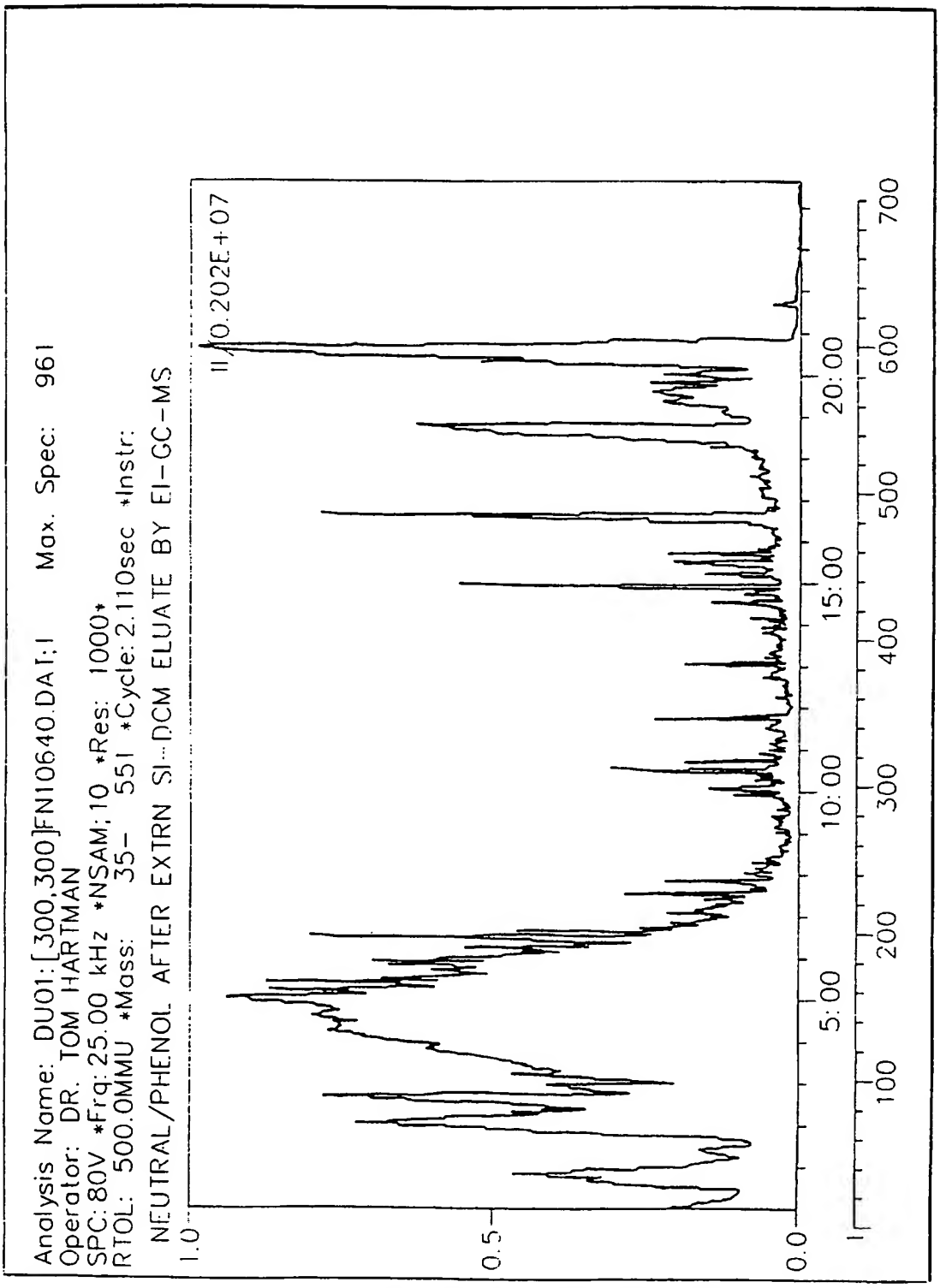
Analysis Name: DU01:[300,300]FN10640.DAT;1 Max. Spec: 961
Operator: DR. TOM HARTMAN
SPC: 80V *Frq: 25.00 kHz *NSAM: 10 *Res: 1000*
RTOL: 500.0MMU *Mass: 35- 551 *Cycle: 2.110sec *Instr:
NEUTRAL/PHENOL AFTER EXTRN SI--DCM ELUATE BY EI-GC-MS
1.0
0.5
0.0
0.202E+07
100
200
300
400
500
600
700
5:00
10:00
15:00
20:00

FIG. 18.

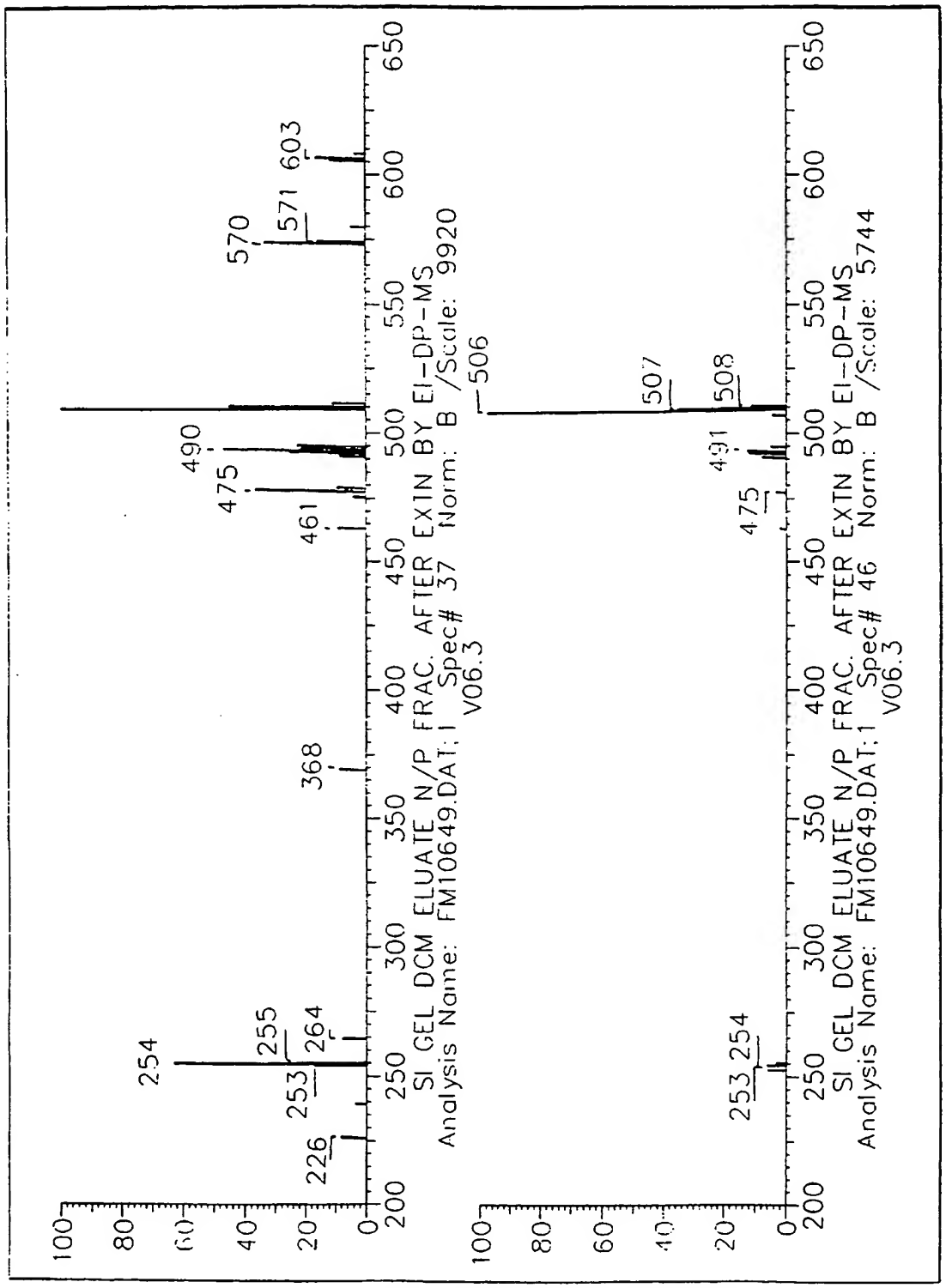
SI GEL DCM ELUATE N/P FRAC. AFTER EXIN BY EI-DP-MS
Analysis Name: FM10649.DAT;1 Spec# 37 Norm: B /Scale: 9920
V06.3
SI GEL DCM ELUATE N/P FRAC. AFTER EXTN BY EI-DP-MS
Analysis Name: FM10649.DAT;1 Spec# 46 Norm: B /Scale: 5744
V06.3

FIG. 19.

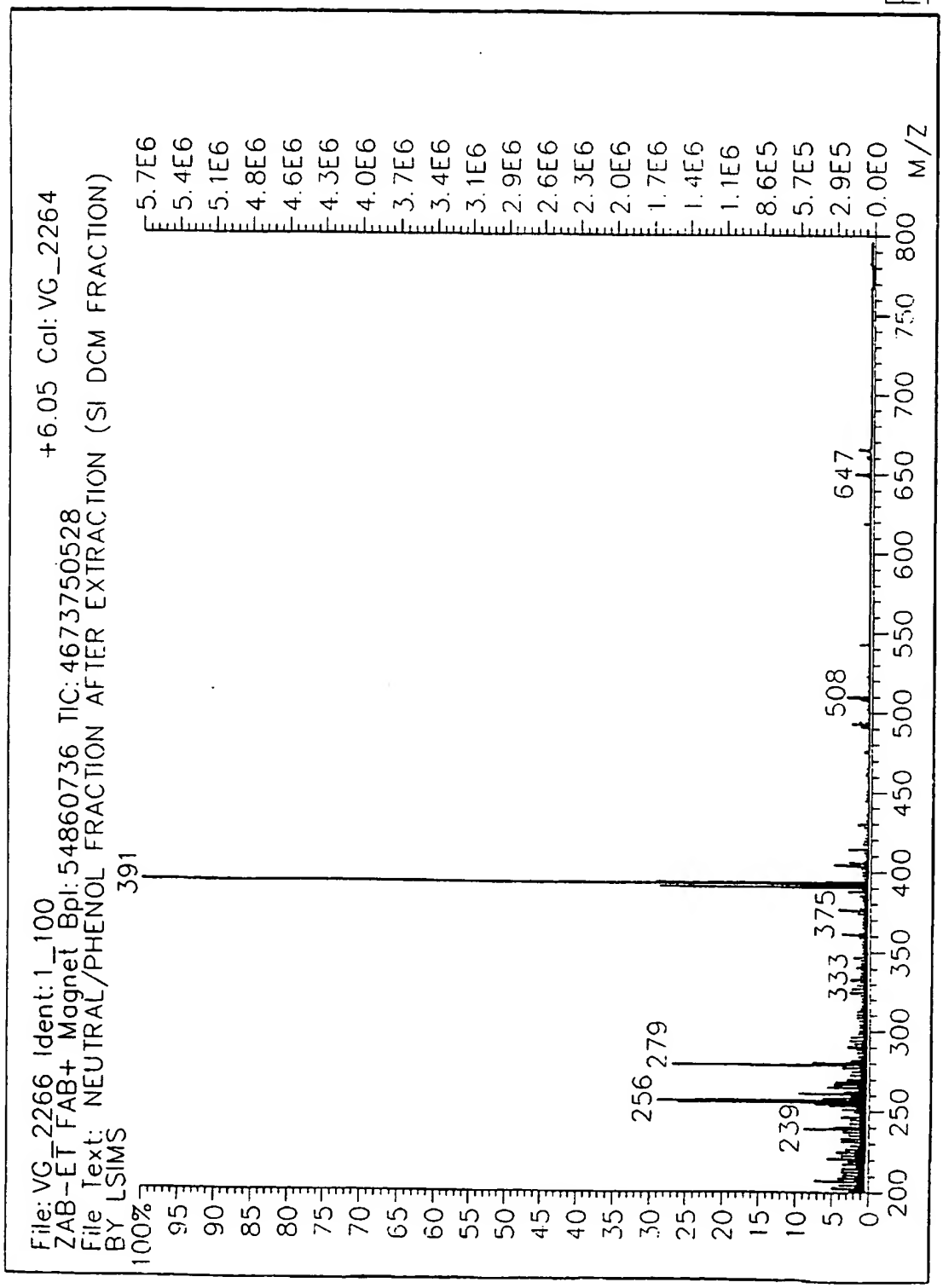
File: VG_2266 Ident: 1_100
ZAB-ET FAB+ Magnet Bpl: 54860736 TIC: 4673750528
File Text: NEUTRAL/PHENOL FRACTION AFTER EXTRACTION (SI DCM FRACTION)
BY LSIMS
+6.05 Cal: VG_2264
100%
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
5.7E6
5.4E6
5.1E6
4.8E6
4.6E6
4.3E6
4.0E6
3.7E6
3.4E6
3.1E6
2.9E6
2.6E6
2.3E6
2.0E6
1.7E6
1.4E6
1.1E6
8.6E5
5.7E5
2.9E5
0.0E0
200 250 300 350 400 450 500 550 600 650 700 750 800 M/Z
391
375
333
279
256
239
508
647

FIG. 20.

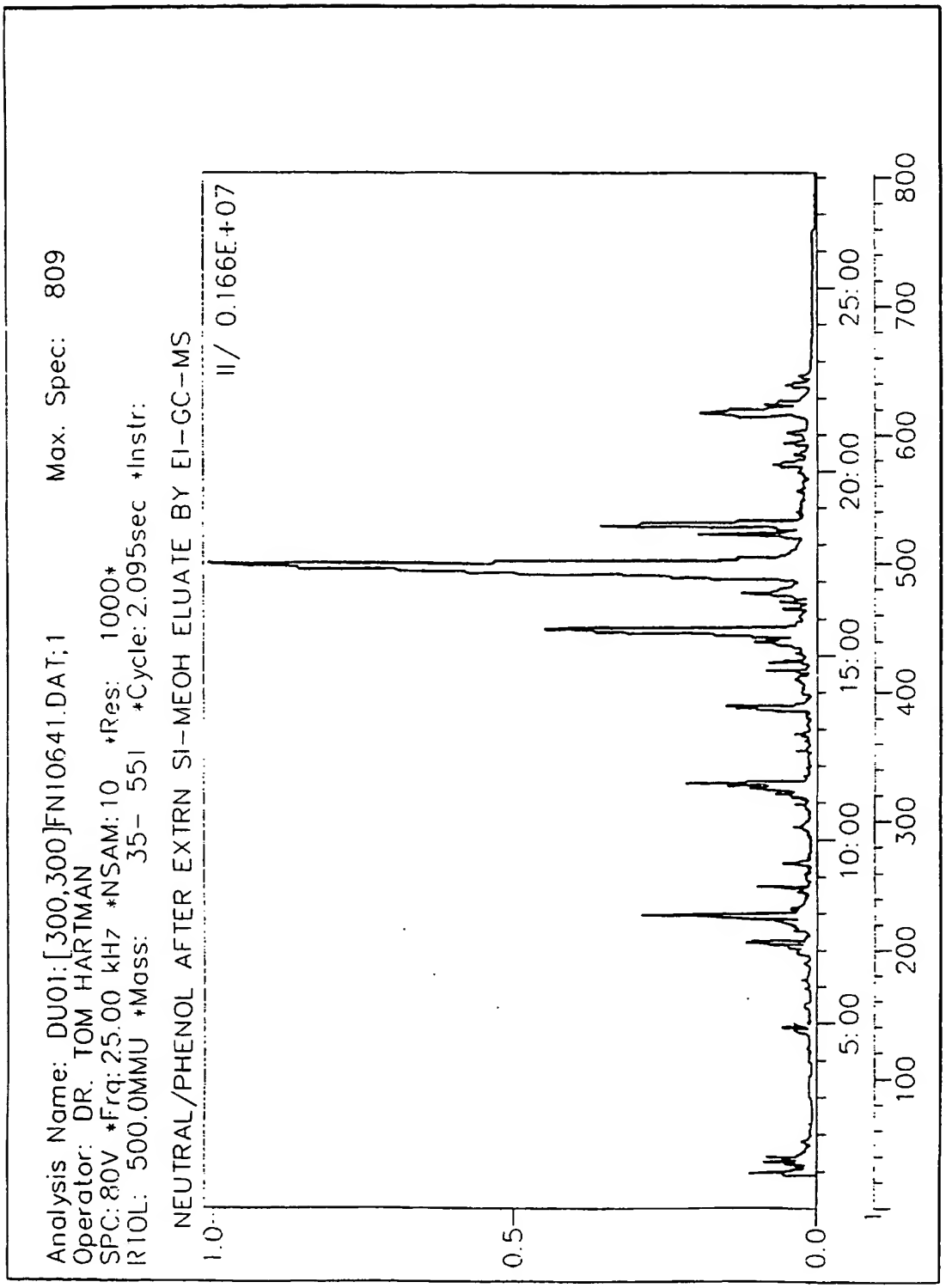
Analysis Name: DU01:[300,300]FN10641.DAT;1
Operator: DR. TOM HARTMAN
SPC: 80V *Frq: 25.00 kHz *NSAM: 10 *Res: 1000*
R10L: 500.0MMU *Mass: 35- 551 *Cycle: 2.095sec *Instr:
NEUTRAL/PHENOL AFTER EXTRN SI-MEOH ELUATE BY EI-GC-MS
Max. Spec: 809
11/ 0.166E+07
1.0
0.5
0.0
5:00
10:00
15:00
20:00
25:00
100
200
300
400
500
600
700
800

FIG. 21.

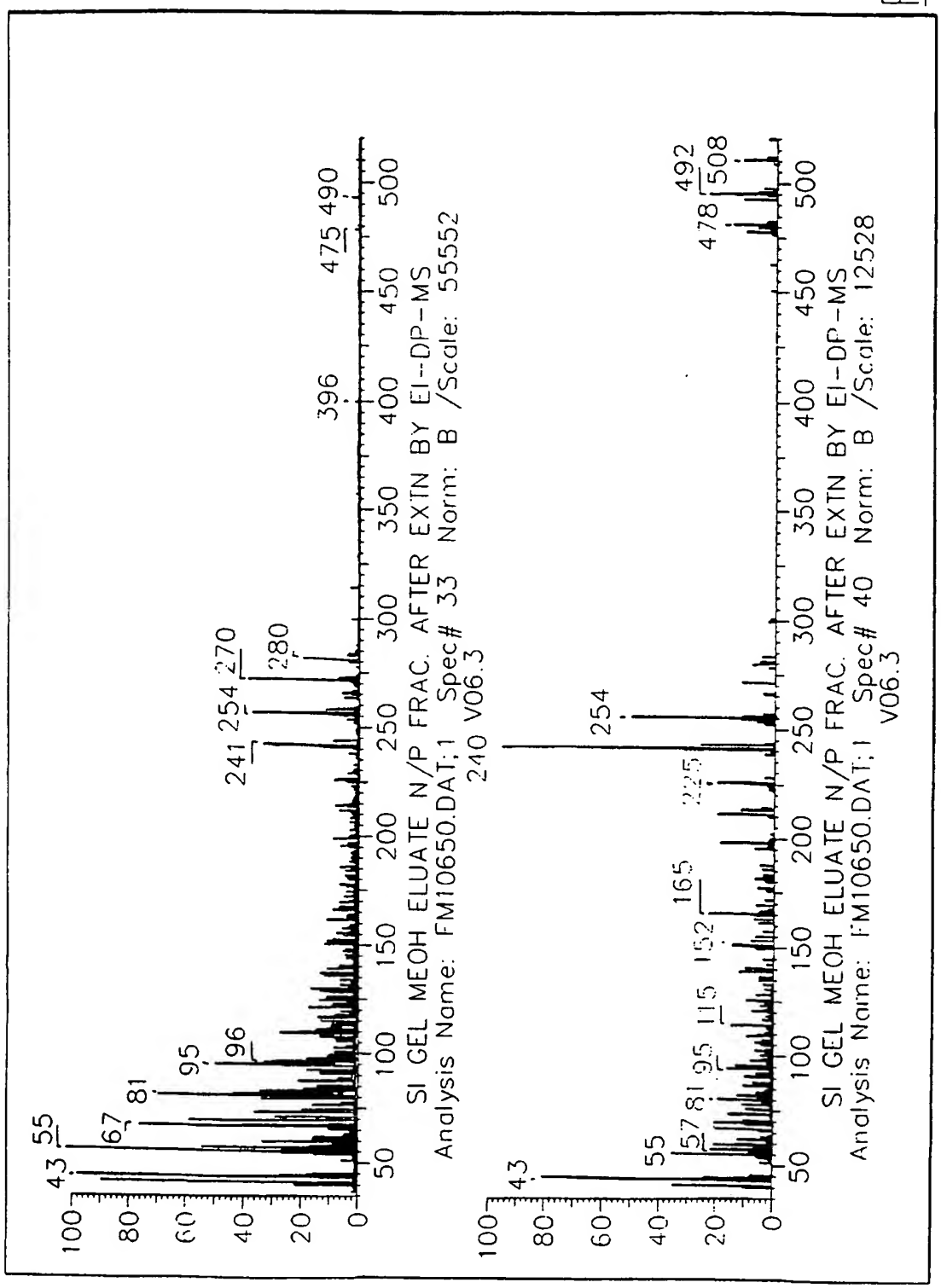
SI GEL MEOH ELUATE N/P FRAC. AFTER EXTN BY EI-DP-MS
Analysis Name: FM10650.DAT;1 Spec# 33 Norm: B /Scale: 55552
V06.3
SI GEL MEOH ELUATE N/P FRAC. AFTER EXTN BY EI-DP-MS
Analysis Name: FM10650.DAT;1 Spec# 40 Norm: B /Scale: 12528
V06.3

FIG. 22.

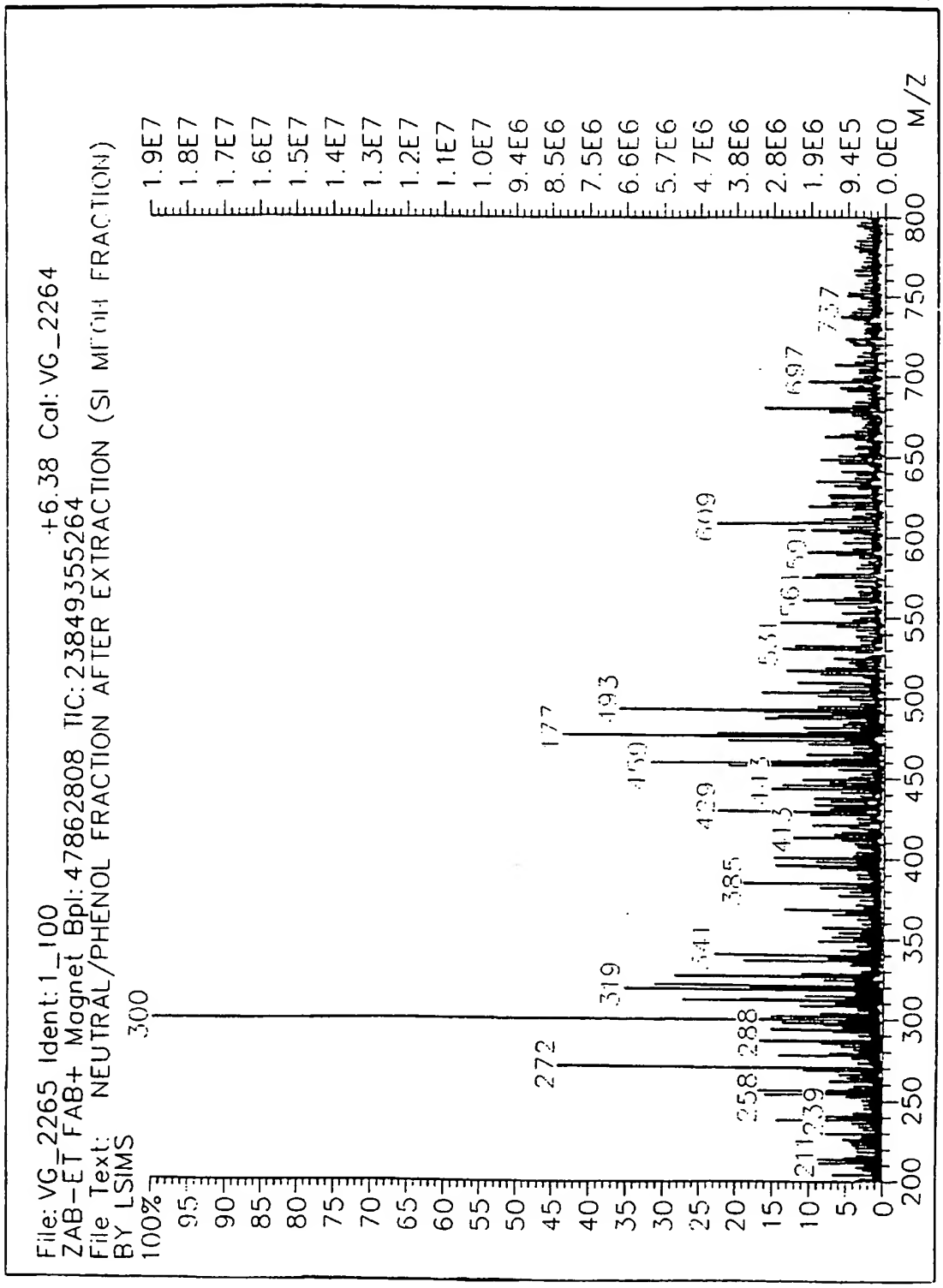
File: VG_2265 Ident: 1_100
ZAB-ET FAB+ Magnet Bpl: 47862808 TIC: 23849355264
File Text: NEUTRAL/PHENOL FRACTION AFTER EXTRACTION (SI METH FRACTION)
BY LSIMS
+6.38 Cal: VG_2264
100%
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1.9E7
1.8E7
1.7E7
1.6E7
1.5E7
1.4E7
1.3E7
1.2E7
1.1E7
1.0E7
9.4E6
8.5E6
7.5E6
6.6E6
5.7E6
4.7E6
3.8E6
2.8E6
1.9E6
9.4E5
0.0E0
M/Z
200
250
300
350
400
450
500
550
600
650
700
750
800
300
272
319
177
193
609
697
737

FIG. 23.

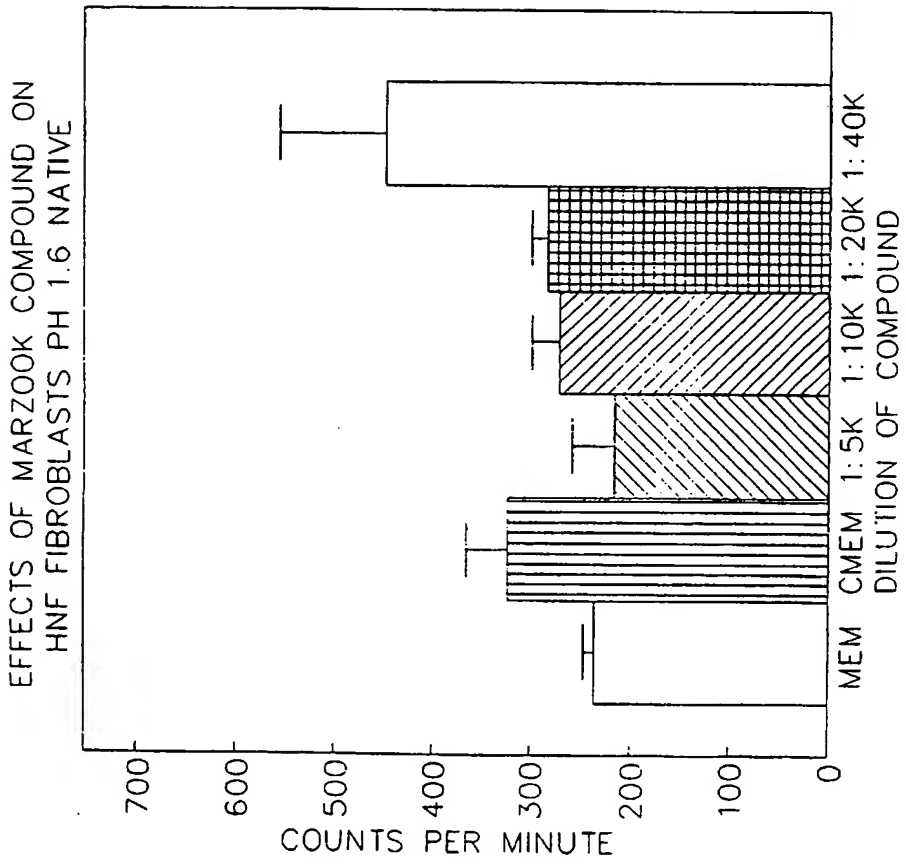
EFFECTS OF MARZOOK COMPOUND ON
HNF FIBROBLASTS PH 1.6 NATIVE
COUNTS PER MINUTE
0
100
200
300
400
500
600
700
MEM
CMEM
1:5K
1:10K
1:20K
1:40K
DILUTION OF COMPOUND

FIG. 24.